

Appendix A

Massachusetts DEP Correspondences

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND - REGION I
ONE CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

Request for General Permit Authorization to Discharge Wastewater
(Notice of Intent to be covered by the General Permit (NOI))

Potable Water Treatment Facility (PWTF)
NPDES General Permit No. MAG640000 and NHG640000

MAR 16 2010

A. Facility Information

1. Facility Owner:

Name GEORGETOWN WATER DEPARTMENT e-mail gsmith@georgetownma.gov
Street/PO Box 1 Moulton Street City GEORGETOWN
State MASSACHUSETTS Zip Code 01833
Contact Person GLENN F. SMITH Telephone Number (978) 352 - 5750

2. Facility Operator (if different from above):

Name e-mail (optional)
Street/PO Box City
State Zip Code
Contact Person Telephone Number

3. Facility Data (attach topographic map or other map showing facility and discharge location(s)):

Name GEORGETOWN WATER TREATMENT PLANT e-mail (optional)
Street/PO Box 75 West Street City GEORGETOWN
State MASSACHUSETTS Zip Code 01833
Contact Person GLENN F. SMITH / RONALD FARWELL Telephone Number (978) 352 - 5738
Facility Latitude +4272020 Facility Longitude -7102208

4. Standard Industrial Classification (SIC Codes) and Descriptions of Processes:

SIC Code(s) 4941 - WATER SUPPLY
Description(s) WATER TREATMENT RESIDUAL FILTRATE

5. Current Permitting Status (please check yes or no):

1. Has a prior NPDES permit been granted for the discharge? Yes ☒ (Permit Number: MAG 640048)
No ☐
2. Is the discharge a "new discharge" as defined by 40 CFR Section 122.22? Yes ☐ No ☒
3. Is the facility covered by an individual NPDES permit? Yes ☐ (Permit Number) No ☐
4. Is there a pending application on file with EPA for this discharge? Yes ☐ (Date of submittal:) No ☒

B. Discharge Information

1. Name of Receiving Waterbody PARKER RIVER
2. Type of Receiving Waterbody (e.g. stream, lake, reservoir, estuary etc) RIVER - 75 ACRE BEAVER DAM IMPOUNDMENT
3. State Water Quality Classification: "B" Freshwater: ☒ Marine Water: ☐
4. Describe the discharge activities for which the owner/applicant is seeking coverage, including process discharges not specifically authorized in the PWTF GP which need to be authorized for discharge (and which attain the

effluent limits and other conditions of the general permit). This description should include all treatment methods used on the wastewater prior to discharge including lagoons, baffles, filter presses etc. If lagoons are used at the facility, please include the number and size of lagoons; the size and elevation of the entry pipe; the time of travel from the entry point of the discharge into the lagoon to the entry point to the receiving water; and the length of backwash cycle for any combination of number of filters. (attach extra sheets if necessary):

THE DISCHARGE IS FILTERED AND/OR DECANTED WATER FROM TWO RESIDUALS LAGOONS. THE RESIDUALS ARE FROM THE IRON & MANGANESE REMOVAL PROCESS USING GREENSAND TREATMENT. THE UNDERDRAINS ARE LEFT OPEN TO DRAIN CONTINUOUSLY. THE FILTERS ARE BACKWASHED DAILY DURING THE SUMMER AND EVERY 3-4 DAYS IN THE WINTER WITH 62,500 GAL. WATER AT UP TO 850 GPM. THE BACKWASH IS DISCHARGED TO AN 80,000 GAL. SURGE TANK THAT LIMITS THE FLOW INTO THE LAGOON TO <120GPM. ONLY ONE LAGOON IS ONLINE AT A TIME. EACH LAGOON IS APPROX. 80,000 GALS. TIME TRAVEL THROUGH THE LAGOON IS UP TO 12 HRS. THE LENGTH OF TIME FOR FLOW FROM THE SURGE TANK IS 19 HRS. THE LAGOON INFLUENT IS AT ELEV. 87.75 FT. THE UNDERDRAIN PIPE IS AT ELEV. 83.7 FT. DECANT OVERFLOW ELEVATION IS 89 FT.

5. Please provide a diagram depicting the treatment methods, outfalls, and receiving water.

6. Number of outfalls: 1 Latitude and Longitude for each outfall (attach additional pages if necessary)
 OUTFALL # 1 Latitude +4243180 Longitude -7101220
 OUTFALL # Latitude Longitude

For each outfall:

7. What is the proposed sampling location(s) and proposed consistent times of the month for collecting samples:

SAMPLES ARE TAKEN FROM THE LAGOON DISCHARGE PIPE AS IT ENTERS THE CHANNEL TO THE WETLAND - ONCE WEEKLY. FOR TEN YEARS SAMPLES HAVE BEEN COLLECTED FOR TSS, CHLORINE RESIDUAL, pH AND TURBIDITY. WEEKLY TESTING FOR ALUMINUM STARTED 3/8/10

C. Effluent Characteristics

1. List here and attach information on any water additives used at the facility (Including chemicals for pH adjustment, dechlorination, control of biological growth, and control of corrosion and scale in water pipes): KOH AND LIME ARE USED FOR pH ADJUSTMENT, KMnO4 IS USED FOR MANGANESE REMOVAL, 12% NaOCl IS USED FOR IRON REMOVAL & DISINFECTION

2. Please report here any known remediation activities or water-quality issues in the vicinity of the discharge.

3. Are aluminum-containing coagulants used at this facility? Yes No ✓

4. Does the discharge contain residual chlorine? Yes ✓ No

5. Does the facility provide treatment to remove arsenic from the raw water source? Yes No ✓

6. Are phosphorus-containing chemicals added to the treated water at this facility? Yes No ✓

7. All applicants must attach a separate sheet listing all laboratory results (minimum of five) for total recoverable aluminum (in micrograms per liter) taken within the last six months. Do not include dilution when recording your results. See Section 4.4.5 of General Permit for more information.

8. Please include the following effluent data for each outfall:

Characteristic (report if measured)	Average Monthly	Maximum Daily
Discharge Flow (gpd)	<u>31,000</u>	<u>65,000</u>
TSS (mg/l)	<u>2.8</u>	<u>21.0</u>
pH (s.u.)	(min) <u>6.6</u>	(max) <u>7.1</u>
Total Recoverable Aluminum (ug/l)	<u>TO BE DETERMINED</u>	<u>0.03mg/L (the only test result to date)</u>
Total Residual Chlorine (ug/l)	<u>200</u>	<u>600</u>

(continued on next page)

8. Continued

Characteristic (report if measured)

Whole Effluent Toxicity (%) LC50 NOT MEASURED and/or C-NOEC NOT MEASURED

9. If the discharge contains aluminum and/or residual chlorine, please provide the reported or calculated seven day-ten year low flow (7Q10) of the receiving water, the dilution factor, and attach any calculations used to support stream flow and dilution calculations (See Appendix VII for dilution calculations and additional information):

7Q10 0.137 cfs Dilution Factor 2.8 cfs

D. Endangered Species Act Eligibility

1. Using the instructions in Appendix I of the PWTF GP, under which criterion listed in Part II are you eligible for coverage under this general permit?
A ☒ B ☐ C ☐ D ☐ E ☐ F ☐
2. If you selected criteria D or F, has consultation with the federal services been completed? Yes ☐ No ☐
3. If consultation with U.S. Fish and Wildlife Service and/or NOAA Fisheries Service was completed, was a written concurrence finding that the discharge is "not likely to adversely affect" listed species or critical habitat received? Yes ☐ No ☐
4. Attach documentation of ESA eligibility as described below and required at Part 3.4.1 and Appendix I, Part III, Step 4, of the General Permit.

Criterion A - No federally-listed threatened or endangered species or federally-designated critical habitat are present: A copy of the most current county species list pages for the county(ies) where your site or facility and discharges are located. You must also include a statement on how you determined that no listed species or critical habitat are in proximity to your site or facility or discharge locations.

Criterion B - Section 7 consultation completed with the Service(s) on a prior project: A copy of the USFWS's and/or NMFS's, as appropriate, biological opinion or concurrence on a finding of "unlikely to adversely effect" regarding the ESA Section 7 consultation.

Criterion C - Activities are covered by a Section 10 Permit: A copy of the USFWS's and/or the NMFS's, as appropriate, letter transmitting the ESA Section 10 authorization.

Criterion D - Concurrence from the Service(s) that the discharge is "not likely to adversely affect" federally-listed species or federally-designated critical habitat (not including the four species of concern identified in Section I of Appendix I): A copy of the USFWS's and/or the NMFS's, as appropriate, letter or memorandum concluding that the discharge is consistent with the general permit's "not likely to adversely affect" determination.

Criterion E - Activities are covered by certification of eligibility: A copy of the documents originally used by the other operator of your site or facility (or area including your site) to satisfy the documentation requirement of Criteria A, B, C or D.

Criterion F - Concurrence from the Service(s) that the discharge is "not likely to adversely affect" species of concern, as identified in Section I of Appendix I: A copy of the USFWS and/or the NMFS, as appropriate, concurrence with the applicant's determination that the discharge is "not likely to adversely affect" listed species.

E. National Historic Properties Act Eligibility

1. Using the instructions in Appendix III of the PWTG GP, under which criterion listed in Part III are you eligible for coverage under this general permit?

1 ☒ 2 ☐ 3 ☐

2. Have any State or Tribal historic preservation officers been consulted in this determination? Yes ☐ No ☒
If yes, attach the results of the consultation(s).

F. Certification

I certify that the discharge for which I am seeking coverage under the general permit consists solely of a surface water discharge from a potable water treatment facility. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature [Signature] Date 3/12/2010
Printed Name and Title CLARENCE A. SMITH, JR. SUPERINTENDENT

Federal regulations require this application to be signed as follows:

1. For a corporation, by a principal executive officer of at least the level of vice president;
2. For partnership or sole proprietorship, by a general partner or the proprietor, respectively, or,
3. For a municipality, State, Federal or other public facility, by either a principal executive officer or ranking elected official.

Note: Permits No. MAG640000 and NHG640000 may be found at www.epa.gov/region4/npdes/signatory.html

NPDES INFO UPDATE - February 2009

REQUESTED INFORMATION TO UPDADE and/or VERIFY THE US EPS ICIS-NPDES DATABASE

You may use additional pages and/or other format to submit this information by March 31, 2008. All information on this form is required on permit applications.

NPDES # MAG 640048Permittee Name: Georgetown Water DepartmentFacility Name: Georgetown Water Treatment PlantLocation Address: 75 West Street, Georgetown MA 01833Cognizant Official (and title) Glenn F. Smith, SuperintendentTelephone # : (978) 352 - 5750 ext. e-mail gsmith@georgetownma.govMailing Address: Georgetown Water Department, One Moulton Street, Georgetown, MA 01833Design Flow (POTW) 2.5 MGD (MGD or other)

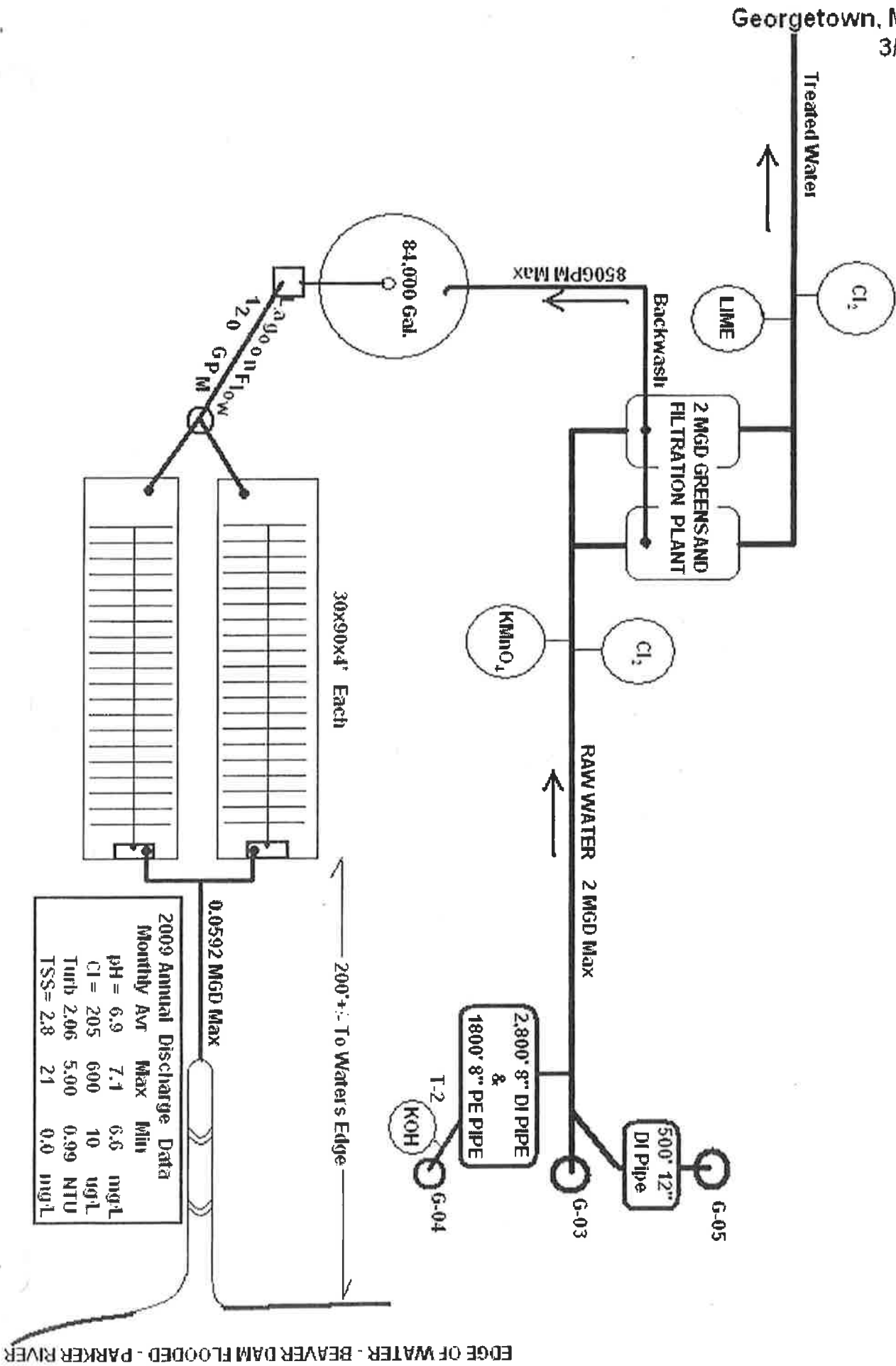
Other Contact(s) specify relationship; Operating Contractor, DMR mailing address (if different than Cognizant address, Pretreatment, Biosolids, Laboratory:

Name, title, relationship Treatment Plant Operator, or Robert Dash, Assistant SuperintendentTelephone# (978) 352 - 5738 ext. e-mail Mailing Address C/O Water Department, One Moulton Street, Georgetown, MA 01833

Outfall Information for each 'end point' discharge including CSO's: (If you have more than 2 outfalls, make copies of this page before filling in the outfall information.) For each CSO, provide actual annual outfall flow, if available.

Outfall # 001AName or Description Water Treatment Residuals Lagoon EffluentLatitude: 42.721688 N (Decimal Degree)+4243180Longitude: 71.022263 W (Decimal Degree)-07101220Method of determination (GPS or map) GIS MapFrom: EPA NPDES web siteProvide Annual Average Flow 0.033 (MGD or other)0.07 MGD MAX

GEORGETOWN, MASSACHUSETTS PWS ID# 3105000-T1
FLOW DIAGRAM

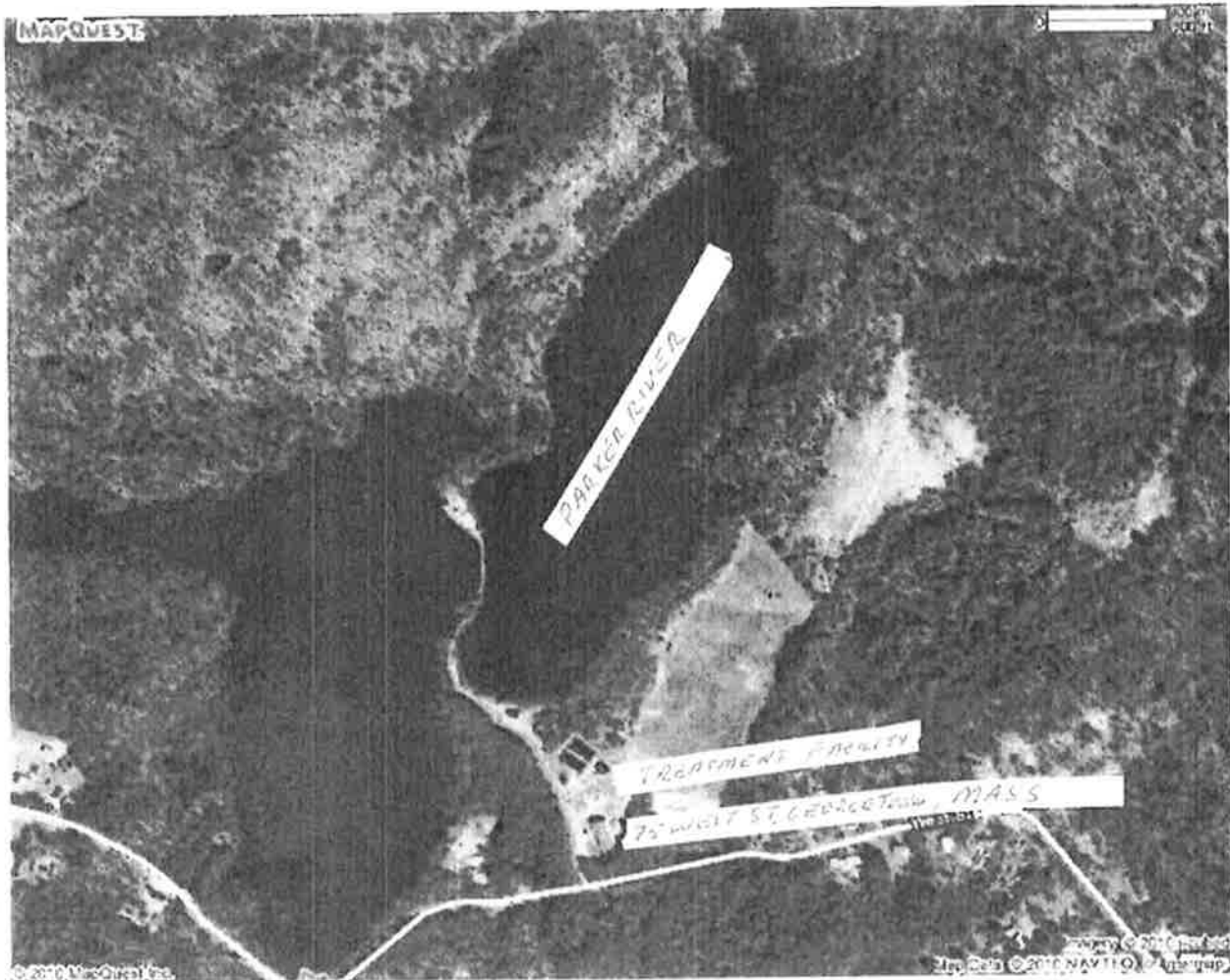


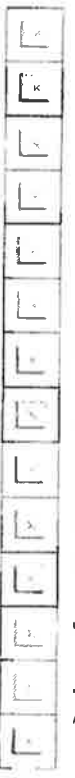


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★ 75 West St
Georgetown, MA 01833-1324





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Georgetown, MA 01833-1324



**COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION**

In the matter of:

Town of Georgetown

File No.: ACOP-NE-11-5D001

**ADMINISTRATIVE CONSENT ORDER WITH PENALTY
AND
NOTICE OF NONCOMPLIANCE**

I. THE PARTIES

1. The Department of Environmental Protection ("Department" or "MassDEP") is a duly constituted agency of the Commonwealth of Massachusetts established pursuant to M.G.L. c. 21A, § 7. MassDEP maintains its principal office at One Winter Street, Boston, Massachusetts 02108, and its Northeast Regional Office at 205 B Lowell Street, Wilmington, MA 01887.
2. The Town of Georgetown ("Respondent") is a Municipality with its principal offices located at 1 Library Street, Georgetown, MA 01833. Respondent's mailing address for purposes of this Consent Order is 1 Library Street, Georgetown, MA 01833.

II. STATEMENT OF FACTS AND LAW

3. MassDEP is responsible for the implementation and enforcement of M.G.L. c. 111, § 159 et seq., 42 U.S.C. §§300f - 300j (the Federal Safe Drinking Water Act), the Drinking Water Regulations at 310 CMR 22.00.
4. MassDEP has authority under M.G.L. c. 21A, § 16 and the Administrative Penalty Regulations at 310 CMR 5.00 to assess civil administrative penalties to persons in noncompliance with the laws and regulations set forth above.
5. Respondent operates a public water supply system ("PWS") and has been issued a Public Water Systems Identification Number (PWS Id # 3105000).
6. The following facts and allegations have led MassDEP to issue this Consent Order:
 - A. Failure to Prepare an Emergency Response Plan/Failure to Respond to NON:

- i. On July 1, 2009, MassDEP sent a letter to all Public Water Systems, including Respondent, requesting that they submit a completed ERP Compliance Checklist to their respective MassDEP regional office by December 31, 2009.
- ii. Respondent submitted its checklist by the required deadline. On the checklist, Respondent indicated that they did not have an Emergency Response Plan (ERP) that fully complied with the requirements of 310 CMR 22.04(13).
- iii. On May 12, 2010, MassDEP conducted a regularly scheduled sanitary survey of Respondent's PWS. During that survey, the compliance status of Respondent's ERP was evaluated. MassDEP determined that Respondent's ERP did not fully comply with the requirements of the Drinking Water Regulations.
- iv. Based on the compliance checklist submitted by Respondent and observations made during the subsequent sanitary survey, MassDEP determined that Respondent violated the requirements of 310 CMR 22.04(13), which states, in part, that:

"Each water supplier must prepare and keep in an easily accessible location an Emergency Response Plan prepared in accordance with 310 CMR 22.04(13) and Massachusetts Drinking Water Guidelines and Policies for Public Water Supplies, Chapter 12 – Emergency Response Planning Requirements Guidance including Appendix O – Handbook for Water Supply Emergencies."
- v. On June 16, 2010, MassDEP issued a Notice of Noncompliance ("NON") (NON-NE-10-5D057) to Respondent describing the above violations, specifying the actions to be taken to return to compliance, and stating the deadlines for performing such actions. Specifically, MassDEP required Respondent to submit a schedule for when Respondent would complete an ERP that fully complied with the requirements of the Massachusetts Drinking Water Regulations by July 23, 2010.
- vi. Respondent responded to the NON as follows: In a letter dated July 20, 2010, which MassDEP received on July 23, 2010, Respondent provided a response to the NON. For a schedule, Respondent wrote that they "conservatively think that this will take years to finish", along with a summary of measures that they have implemented.

B. Failure to Comply with the Requirements of the Groundwater Rule (310 CMR 22.26)

- i. The Drinking Water Regulations, specifically the provisions of 310 CMR 22.26 (3)(i), state, in relevant part:

"The system must notify the Department by the end of the day that the system is notified of a fecal indicator-positive source water test result. ... In no circumstance shall notification be performed more than 24 hours after receiving notification from the laboratory."

- ii. The Drinking Water Regulations, specifically the provisions of 310 CMR 22.26(3)(a)4., states:

If the Department does not require corrective action under 310 CMR 22.26(4)(a)2. For a fecal indicator-positive source water sample collected under 310 CMR 22.26(3)(a)2. That is not invalidated under 310 CMR 22.26(3)(d), the system must collect five additional source water samples from the same source within 24 hours of being notified of the fecal indicator-positive sample.

- iii. On September 7, 2010, Respondent collected a sample of the raw water from the Duffy's Landing Well (Source Id #3105000-05G) to determine the presence of bacteria as required under the Total Coliform Rule.
- iv. On or about September 8, 2010, Respondent was notified by its MassDEP certified lab that the sample collected on September 7, 2010 was positive for *E. coli*.
- v. On September 9, 2010, Respondent collected a second, single sample from the well and sent it to the lab to be analyzed for bacteria. *E. coli* was also found to be present in that sample.
- vi. At 2:41 pm on Friday, September 10, 2010, Respondent sent an electronic message to MassDEP to report that the Duffy Well was "Coliform Positive Tuesday & Thursday".
- vii. By failing to notify MassDEP within 24 hours of notification that a source water sample was positive for *E. coli*, Respondent violated the Drinking Water Regulations, specifically the provisions of 310 CMR 22.26(3)(i).
- viii. By failing to collect five additional source water samples from the same source within 24 hours of being notified of the fecal indicator-positive sample, Respondent violated the Drinking Water Regulations, specifically the provisions of 310 CMR 22.26(3)(a)4..

- C. Failure to operate and maintain a water system in a manner that ensures the delivery of safe water.

- i. The Drinking Water Regulations, specifically the provisions of 310 CMR 22.04(7), state:

Each supplier of water shall operate and maintain its system in a manner that ensures the delivery of safe drinking water to consumers. In determining whether a supplier of water is properly operating and maintaining a public water system, the Department will apply the standards for public water systems set forth in the Drinking Water Program's "Guidelines and Policies for Public Water Systems,"

- ii. On November 9, 2009, MassDEP received a complaint about the quality of Respondent's water. The complaint was related to aesthetic concerns (taste, odor, color). Water quality analysis information provided as part of the complaint indicated levels of manganese that exceeded the secondary limit established by the Drinking Water Regulations. MassDEP forwarded the information to Respondent for investigation and response.
- iii. In response, Respondent acknowledged the aesthetic problems and provided information related to its own on-going investigation of taste and odor problems.
- iv. During a routine sanitary survey inspection on May 12, 2010, Respondent reported similar complaints at various locations within its distribution system and noted that an engineering consultant was preparing a report that would include an evaluation of the water quality.
- v. In the June 11, 2010 sanitary survey report, MassDEP noted the complaints as reported by Respondent and that Respondent expected to receive a report that would include an evaluation of the water quality problems from its engineering consultant. As a requirement of the sanitary survey report, MassDEP requested Respondent to submit a copy of the report by September 30, 2010.
- vi. To date, MassDEP has not received the report from Respondent. Respondent has contacted MassDEP and reported that the report was not complete, but did not request additional time to comply with the requirements of the sanitary survey report.
- vii. By failing to deliver water to its users that is free of aesthetic problems, Respondent violated, and continues to violate, the Drinking Water Regulations specifically the provisions of 310 CMR 22.04(7).

D. Failure to Comply with Disinfection Byproducts Monitoring Requirements

- i. Respondent uses ground water sources as its source of public water supply to serve approximately 8,052 people. As part of its treatment, Respondent adds sodium hypochlorite, a chemical disinfectant, at its one treatment plant.
- ii. The Massachusetts Drinking Water Regulations, specifically the provisions of 310 CMR 22.07E(7)(b)1, require all Public Water Systems that are using a chemical disinfectant to treat only ground water not under direct influence of surface water and serving fewer than 10,000 persons to collect one sample per treatment plant for the analysis of total trihalomethanes (TTHM) and haloacetic acids (five) (HAA5) once per year during August.
- iii. The Massachusetts Drinking Water Regulations, specifically the provisions of 310 CMR 22.07B(9), state:

"Each supplier of water who is required to sample quarterly or more frequently shall report to the Department within ten days after the end of each quarter in which samples were collected, notwithstanding the provisions of 310 CMR 22.15. Each supplier of water who is required to sample less frequently than quarterly shall report to the Department within ten days after the end of each monitoring period in which samples were collected."

- iv. On November 3, 2010, MassDEP determined that it had not received a copy of the analysis reports for the TTHM and HAA5 samples Respondent was required to collect in August 2010.
- v. On November 4, 2010, Respondent reported to MassDEP that it had not collected the August TTHM HAA5 samples.
- vi. By failing to collect the TTHM and HAA5 samples, Respondent violated the Drinking Water Regulations, specifically the provisions of 310 CMR 22.07E(7)(b)1.
- vii. By failing to report to DEP analytical results of the TTHM and HAA5 during August 2010, and notify the DEP of the failure to monitor, the Respondent violated the Drinking Water Regulations, specifically the provisions of 310 CMR 22.15.
- viii. By failing to notify the public of the failure to monitor, the Respondent violated the Drinking Water Regulations, specifically the provisions of 310 CMR 22.16.

III. DISPOSITION AND ORDER

For the reasons set forth above, MassDEP hereby issues, and Respondent hereby consents to, this Order:

7. The parties have agreed to enter into this Consent Order because they agree that it is in their own interests, and in the public interest, to proceed promptly with the actions called for herein rather than to expend additional time and resources litigating the matters set forth above. Respondent enters into this Consent Order without admitting or denying the facts or allegations set forth herein. However, Respondent agrees not to contest such facts and allegations for purposes of the issuance or enforcement of this Consent Order.

8. MassDEP's authority to issue this Consent Order is conferred by the Statutes and Regulations cited in Part II of this Consent Order.

9. Respondent shall perform the following actions:

- A. On or before June 30, 2011, Respondent shall complete an Emergency Response Plan that fully complies with the requirements of 310 CMR 22.04(13).
- B. On or before June 30, 2011, Respondent shall submit a completed copy of an ERP Compliance Checklist to MassDEP.
- C. On or before March 31, 2011, Respondent shall submit a Standard Operating Procedure outlining steps required for compliance with the Groundwater Rule to MassDEP for its review and approval.
- D. On or before March 31, 2011, Respondent shall submit to MassDEP, for review and approval, a copy of the engineering report on the water quality issues identified in the sanitary survey report, to include the chlorine residual decrease in the distribution system, along with a written plan and schedule for implementing the report's recommendations.
- E. Within thirty (30) days of the effective date of this Consent Order, Respondent shall collect a sample for the evaluation of TTHM and HAA5. Respondent shall then submit a copy of the completed sample analysis report as required by the Drinking Water Regulations.
- F. On or before September 1, 2011, Respondent shall provide public notice of its failure to monitor and report disinfection byproducts in accordance with 310 CMR 22.16 and submit a copy of the notice to MassDEP and the Georgetown Board of Health. Respondent must also complete and submit the attached MVRF and/or public notice certification form with the submission to MassDEP.

- G. Alternatively, Respondent may include the required Tier 3 public notice within its annual Consumer Confidence Report (CCR) under the following conditions: the CCR is either mailed or otherwise directly delivered; it follows the content requirements under 310 CMR 22.16(5); and it is provided to consumers no later than September 1, 2011. Respondent must also submit the required public notice certification form with its CCR submission to DEP.
- H. On or before September 1, 2011, Respondent shall provide public notice of its failure to collect appropriate repeat bacteria samples in accordance with 310 CMR 22.16 and submit a copy of the notice to MassDEP and the Georgetown Board of Health. Respondent must also complete and submit the attached MVRP and/or public notice certification form with the submission to MassDEP.
- I. Alternatively, Respondent may include the required Tier 3 public notice within its annual Consumer Confidence Report (CCR) under the following conditions: the CCR is either mailed or otherwise directly delivered; it follows the content requirements under 310 CMR 22.16(5); and it is provided to consumers no later than September 1, 2011. Respondent must also submit the required public notice certification form with its CCR submission to MassDEP.

10. Except as otherwise provided, all notices, submittals and other communications required by this Consent Order shall be directed to:

Thomas Mahin
Drinking Water Program
MassDEP, Northeast Regional Office
205B Lowell Street
Wilmington, MA 01887

Such notices, submittals and other communications shall be considered delivered by Respondent upon receipt by MassDEP.

11. All engineering work performed pursuant to this Consent Order shall be under the general direction and supervision of a qualified professional engineer registered in Massachusetts experienced in the design, operation, and maintenance of water supply and treatment facilities. Any contractual relationship between Respondent and the engineer for work required hereunder shall require the engineer, as a condition of the contract, to implement work consistent with the provisions of this Consent Order.

12. Actions required by this Consent Order shall be taken in accordance with all applicable federal, state, and local laws, regulations and approvals. This Consent Order shall not be construed as, nor operate as, relieving Respondent or any other person of the necessity of complying with all applicable federal, state, and local laws, regulations and approvals.

13. For purposes of M.G.L. c. 21A, § 16 and 310 CMR 5.00, this Consent Order shall also serve as a Notice of Noncompliance for Respondent's noncompliance with the requirements cited in Part II above. MassDEP hereby determines, and Respondent hereby agrees, that the deadlines set forth above constitute reasonable periods of time for Respondent to take the actions described.

14. Respondent shall pay to the Commonwealth the sum of **Eight Thousand, Four Hundred and Seventy Dollars (\$8,470.00)** as a civil administrative penalty for the violations identified in Part II above, as follows:

A. Within thirty (30) days of the effective date of this Consent Order, Respondent shall pay to the Commonwealth **Two Thousand and Five Hundred Dollars (\$2,500.00)**; and

B. MassDEP hereby agrees to suspend payment of the sum of **Five Thousand, Nine Hundred, and Seventy Dollars (\$5,970.00)**; provided, however, that if Respondent violates any provision of this Consent Order, or further violates any of the regulations cited in Part II above within one year of the effective date of this Consent Order, Respondent shall pay to the Commonwealth the remaining amount of **Five Thousand, Nine Hundred, and Seventy Dollars (\$5,970.00)** within thirty (30) days of the date MassDEP issues Respondent a written demand for payment. This paragraph shall not be construed or operate to bar, diminish, adjudicate, or in any way affect, any legal or equitable right of MassDEP to assess Respondent additional civil administrative penalties, or to seek any other relief, with respect to any future violation of any provision of this Consent Order or any law or regulation;

15. Respondent understands, and hereby waives, its right to an adjudicatory hearing before MassDEP on, and judicial review of, the issuance and terms of this Consent Order and to notice of any such rights of review. This waiver does not extend to any other order issued by the MassDEP.

16. This Consent Order may be modified only by written agreement of the parties hereto.

17. The provisions of this Consent Order are severable, and if any provision of this Consent Order or the application thereof is held invalid, such invalidity shall not affect the validity of other provisions of this Consent Order, or the application of such other provisions, which can be given effect without the invalid provision or application, provided however, that MassDEP shall have the discretion to void this Consent Order in the event of any such invalidity.

18. Nothing in this Consent Order shall be construed or operate as barring, diminishing, adjudicating or in any way affecting (i) any legal or equitable right of MassDEP to issue any additional order or to seek any other relief with respect to the subject matter covered by this Consent Order, or (ii) any legal or equitable right of MassDEP to pursue any other claim, action, suit, cause of action, or demand which MassDEP may have with respect to the subject matter covered by this Consent Order, including, without limitation, any action to enforce this Consent Order in an administrative or judicial proceeding.

19. This Consent Order shall not be construed or operate as barring, diminishing, adjudicating, or in any way affecting, any legal or equitable right of MassDEP or Respondent with respect to any subject matter not covered by this Consent Order.

20. This Consent Order shall be binding upon Respondent and upon Respondent's successors and assigns. Respondent shall not violate this Consent Order and shall not allow or suffer Respondent's employees, agents, contractors or consultants to violate this Consent Order. Until Respondent has fully complied with this Consent Order, Respondent shall provide a copy of this Consent Order to each successor or assignee at such time that any succession or assignment occurs.

21. In addition to the penalty set forth in this Consent Order (including any suspended penalty), if Respondent violates any provision of the Consent Order, Respondent shall pay stipulated civil administrative penalties to the Commonwealth in the amount of \$1,000.00 per day for each day, or portion thereof, each such violation continues.

Stipulated civil administrative penalties shall begin to accrue on the day a violation occurs and shall continue to accrue until the day Respondent corrects the violation or completes performance, whichever is applicable. Stipulated civil administrative penalties shall accrue regardless of whether MassDEP has notified Respondent of a violation or act of noncompliance. All stipulated civil administrative penalties accruing under this Consent Order shall be paid within thirty (30) days of the date MassDEP issues Respondent a written demand for payment. If simultaneous violations occur, separate penalties shall accrue for separate violations of this Consent Order. The payment of stipulated civil administrative penalties shall not alter in any way Respondent's obligation to complete performance as required by this Consent Order. MassDEP reserves its right to elect to pursue alternative remedies and alternative civil and criminal penalties which may be available by reason of Respondent's failure to comply with the requirements of this Consent Order. In the event MassDEP collects alternative civil administrative penalties, Respondent shall not be required to pay stipulated civil administrative penalties pursuant to this Consent Order for the same violations.

Respondent reserves whatever rights it may have to contest MassDEP's determination that Respondent failed to comply with the Consent Order and/or to contest the accuracy of MassDEP's calculation of the amount of the stipulated civil administrative penalty. Upon exhaustion of such rights, if any, Respondent agrees to assent to the entry of a court judgment if such court judgment is necessary to execute a claim for stipulated penalties under this Consent Order.

22. Respondent shall pay all civil administrative penalties due under this Consent Order, including suspended and stipulated penalties, by certified check, cashier's check, or money order made payable to the Commonwealth of Massachusetts. Respondent shall clearly print on the face of its payment Respondent's full name, the file number appearing on the first page of this Consent Order, and the Respondent's Federal Employer Identification Number, and shall mail it to:

Commonwealth of Massachusetts
Department of Environmental Protection
Commonwealth Master Lockbox
P.O. Box 3982
Boston, Massachusetts 02241-3982

In the event Respondent fails to pay in full any civil administrative penalty as required by this Consent Order, then pursuant to M.G.L. c. 21A, § 16, Respondent shall be liable to the Commonwealth for up to three (3) times the amount of the civil administrative penalty, together with costs, plus interest on the balance due from the time such penalty became due and attorneys' fees, including all costs and attorneys' fees incurred in the collection thereof. The rate of interest shall be the rate set forth in M.G.L. c. 231, § 6C.

23. Failure on the part of MassDEP to complain of any action or inaction on the part of Respondent shall not constitute a waiver by MassDEP of any of its rights under this Consent Order. Further, no waiver by MassDEP of any provision of this Consent Order shall be construed as a waiver of any other provision of this Consent Order.

24. To the extent authorized by the current owner, Respondent agrees to provide MassDEP, and MassDEP's employees, representatives and contractors, access at all reasonable times to the Georgetown Water Department for purposes of conducting any activity related to its oversight of this Consent Order. Notwithstanding any provision of this Consent Order, MassDEP retains all of its access authorities and rights under applicable state and federal law.

25. This Consent Order may be executed in one or more counterpart originals, all of which when executed shall constitute a single Consent Order.

26. The undersigned certify that they are fully authorized to enter into the terms and conditions of this Consent Order and to legally bind the party on whose behalf they are signing this Consent Order.

27. This Consent Order shall become effective on the date that it is executed by MassDEP.

In the Matter of: Town of Georgetown
ACOP # ACOP-NE-11-5D001

Page 11

Consented To:
Town of Georgetown

By: C. Donald Surace For P. Trapani ^{B.O.S.}
Philip Trapani, Chairman
Board of Selectmen
Town of Georgetown
1 Library Street
Georgetown, MA 01833

By: Reidar W. Bomengen
Reidar W. Bomengen, Chairman
Water Commission
Town of Georgetown
1 Library Street
Georgetown, MA 01833

Date: 1/24/2011

Date: 1/25/2011

Federal Employer Identification No.: 04-6001155

Issued By:
DEPARTMENT OF ENVIRONMENTAL PROTECTION

By: [Signature]
Richard J. Chalpin
Regional Director
MassDEP
205B Lowell Street
Wilmington, MA 01887

Date: 1/25/11

Georgetown water Department

1 Moulton Street Georgetown, MA 01833-1943
Tel. 978-352-5750 Fax. 978-352-5706
E-mail gsmith@georgetownma.gov
PWS ID# 3105000



Eric Worrall, Deputy Regional Director
Department of Environmental Protection
Bureau of Resource Protection / NERO
205 B Lowell Street
Wilmington MA 01887

Re: Monitoring Plan

Georgetown Water Department has established the following sampling plan to monitor the effectiveness of the operational changes that are being made.

We have set up ten monitoring sites spread out through the town. We will also monitor samples from the Water Treatment Plant, the Water Office, the Elevated Storage Tank and the Concrete Reservoirs when safe to do so.

The ten monitoring sites were selected for their accessibility, location on the distribution system, consistency of water usage and history of water quality issues.

#1 VFW hall on Andover Street is at the far western end of the distribution system .

#2 Elderly Housing Office on Trestle Way is off of the northwest distribution main supply leg.

#3 Pentucket Medical Center on East Main Street is near the downtown area on the southeast distribution leg. There has been a history of hot water odor problems here over the past couple of years.

#4 Nunan's Greenhouses & Flouriest 268 Central Street is on the South Side of the distribution System

#5 Erie Fire Station on North Street is at the far northern end of the distribution system.

#6 Georgetown Electric Office is on the eastern-middle part of the distribution system. There has been a history of hot water odor problems here over the past couple of years.

Sampling Plan October 19, 2011

#7 Farm Lane Realty Trust on Farm Lane is in the middle of the northeastern most water main loop feeding the area of town that historically has had the most water quality issues.

#8 Patriot Lane Booster Station on the Access Road is at the entrance to Longview Apartments prior to their treatment processes. The Apartments have been one of the biggest problem areas with water quality.

#9 South Byfield Church Hall on Jackman Street is at the far eastern of the distribution system.

#10 3 Raymond Road is in a residential neighborhood of newer homes. This address has a home based business to allowing daytime access for sampling. This neighborhood is in the area with the worst water quality complaint history.

Each of the fourteen sites listed above will be sampled monthly for:
Water Temperature, Free & Total Chlorine Residuals, pH, Iron, Manganese, Sulfate and in times of Odor problems Hydrogen Sulfide.

In addition to these regular samples we will continue to analyze random samples passed on complaints from customers. We will also attempt short term mitigation of problems through flushing of water mains and house services.

The Elevated Tank and the Concrete Reservoirs are all on Baldepate Road in the southwest part of town. The Elevated tank turns over 25% of its volume two to four times a day. The Concrete Reservoirs turn over 5% two to four times a day. By adjusting the well pump controls we can change out 15% over a few day span to reduce the age of the water in the reservoirs.

If there are any questions please call me at the above numbers.

Thank you.

Sincerely;



Glenn F. Smith, Superintendent
Georgetown Water Department

For MONTH:

For MONTH:

SEND TO: Eric Worrall, Deputy Reg-

					Project Name

SEND TO: Eric Worrall, Deputy Regional Director, MassDEP									
Company:		PWS ID # 3105000		Purchase Order		Project #		Project Name DEP MONTHLY SAMPLES	
Georgetown Water Department									
Contact Person Glenn F. Smith		Address 1 Moulton Street		E-mail gsmith@georgetownma.gov					
City Georgetown		State MA		Zip 01833-1943		Phone: (978) 352-5750			
Location		Date		Time		Sample Location / Source			
Bot. #		Type		COMP		GRAB		MATRIX	
1		SS		X		X		DW VFW HALL	
2		SS		X		X		DW ELDERLY HOUSING	
3		SS		X		X		DW PENTUCKET MEDICAL	
4		SS		X		X		DW NUNAN'S FLOURIST	
5		SS		X		X		DW ERIE FIRE STATION	
6		SS		X		X		DW GEORGETOWN ELECTRIC	
7		SS		X		X		DW FARM LANE REALTY TRUST	
8		SS		X		X		DW PATRIOT LANE BOOSTER	
9		SS		X		X		DW SOUTH BYFIELD CHURCH	
10		SS		X		X		DW 3 RAYMOND ROAD	
		SS							
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- 12" WATER MAIN
- 10" WATER MAIN
- 8" WATER MAIN
- 6" WATER MAIN
- Water Tank

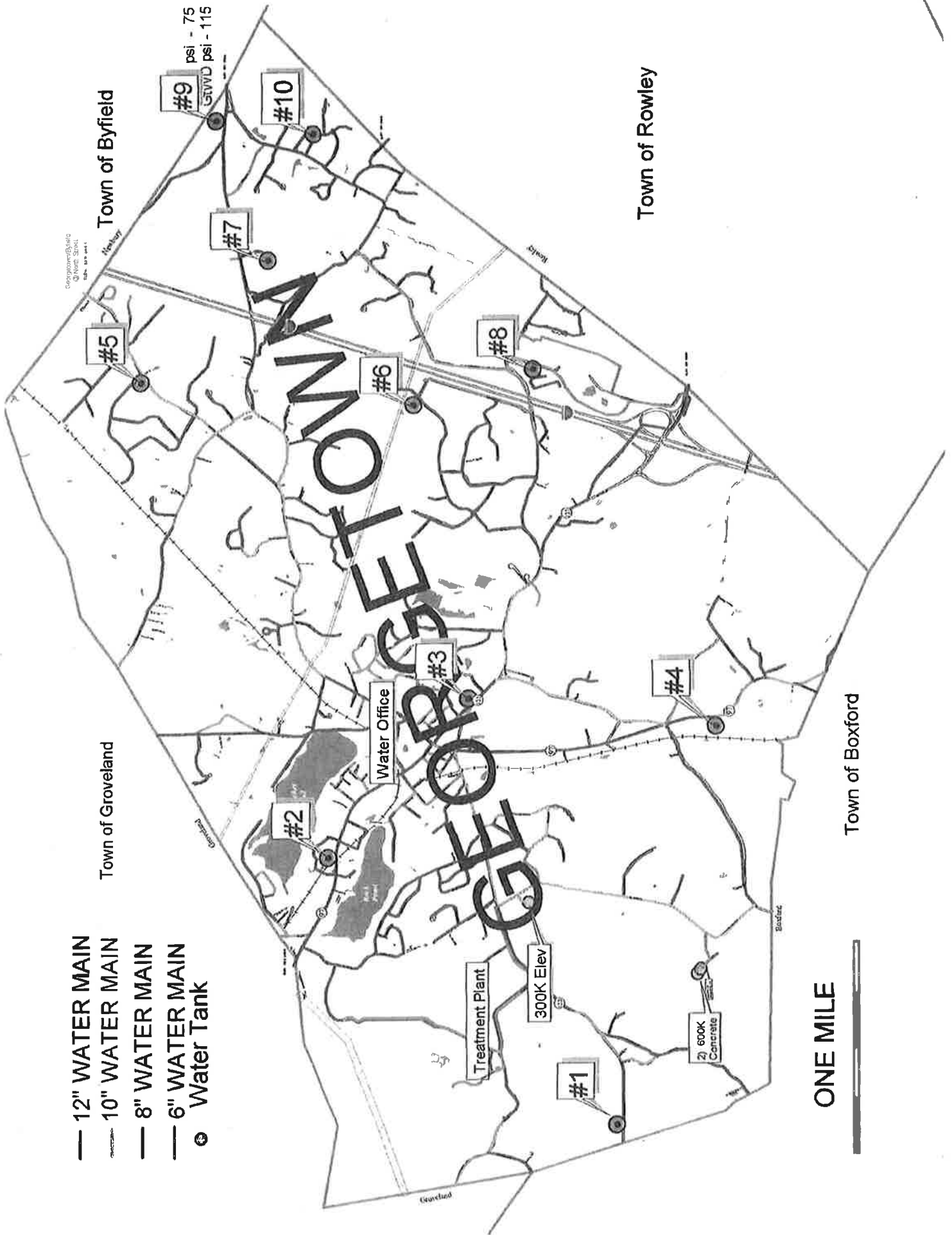
Town of Groveland

Town of Byfield

Town of Rowley

Town of Boxford

ONE MILE



Georgetown water Department

1 Moulton Street Georgetown, MA 01833-1943
Tel. 978-352-5750 Fax. 978-352-5706
E-mail gsmith@georgetownma.gov
PWS ID# 3105000



October 20, 2011

Eric Worrall, Deputy Regional Director
Department of Environmental Protection
Bureau of Resource Protection / NERO
205 B Lowell Street
Wilmington MA 01887

Re: Water Quality Improvements Schedule

Georgetown Water Department has established the following schedule for implementing changes recommended by Wright/Pierce Engineers that will improve the quality of the water in the Georgetown Distribution system.

There are two copies of the Improvements Schedule and two copies of the Sampling Plan that we will use to monitor the effectiveness of the recommended improvements as they are completed.

The because some of these projects will take time to complete Georgetown Water has undertaken some measures to help mitigate the problems in the short term. All three water supply wells have been cleaned and disinfected within the past two years. The Three water storage tanks were cleaned and disinfected October 10th & 11th 2011. The semi-annual system wide flushing began October 17th. We will continue the practice of spot flushing in response to customer complaints. The Marshall/Duffy Rehabilitation and pH Adjustment project is well under way and preliminary design and cost estimate has been completed for the Clear Well/Backwash project. Discussions have begun with AECOM engineers about relocating the chlorine injection point for more efficient Iron removal and the conversion from Lime to Liquid Caustic (Sodium or Potassium Hydroxide) for the finished water at the water treatment plant.

The Elevated Tank and the Concrete Reservoirs are all on Baldpate Road in the southwest part of town. The Elevated tank turns over 25% of its volume two to four times a day. The Concrete Reservoirs turn over 5% two to four times a day. By adjusting the well pump controls we can change out 15% over a few day span to reduce the age of the water in the reservoirs.

If there are any questions please call me at the above numbers.

Thank you.

Sincerely;

Glenn F. Smith, Superintendent
Georgetown Water Department

CC: Thomas Mahin
Nicholas Zessoules

1	2
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Design
Engineering
Financing
Bids to Construction
Construction

Water Fact Sheet

Web Road Flushing Hydrant

Marshall/Duffy pH

Chemical Feed Modification

Clear Well Backwash

Mixing System for Reservoir

Longhai Water Tank

Treatment Plant Upgrade

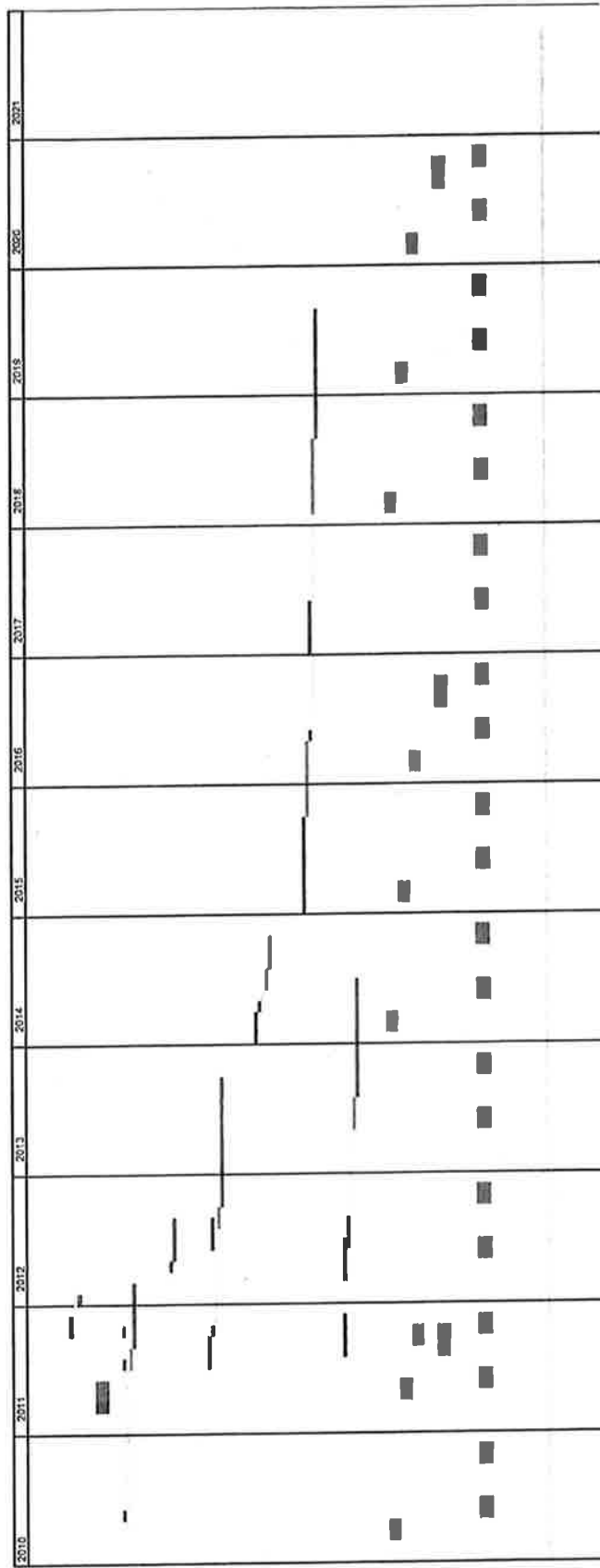
Well Cleaning & Redevelopment

Commissioners
Duffy's
Members

MARSHALL

Janics Clean & Inspect

System Flushing





Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Northeast Regional Office • 205B Lowell Street, Wilmington MA 01887 • 978-694-3200

DEVAL L. PATRICK
Governor

TIMOTHY P. MURRAY
Lieutenant Governor

RICHARD K. SULLIVAN JR.
Secretary

KENNETH L. KIMMELL
Commissioner

November 18, 2011

Glenn Smith
Georgetown Water Department
1 Moulton Street
Georgetown, MA 01833

Re: City/Town: Georgetown
PWS Name: Georgetown Water Department
PWS ID #: 3105000
Program: Enforcement
Action: Approval of Plan and Schedule for
Implementing Water Quality Report
Recommendations
Activity No.: ACOP-NE-11-5D001

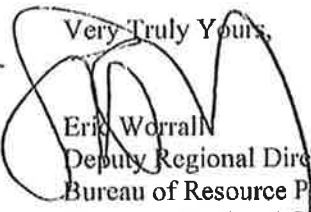
Dear Mr. Smith:

The Department has reviewed the plan and schedule sent with your letter dated October 20, 2011. Paragraph 9.D. of Administrative Consent Order with Penalty ACOP-NE-11-5D001 required submittal of a plan and schedule for implementing the recommendations of the engineering report for addressing the identified water quality concerns.

With this notification, the Department grants its approval of the plan and schedule as called for in the Consent Order.

If you have any questions regarding this letter, please contact Nick Zessoules at (978) 694-3230.

Very Truly Yours,


Erik Worrall
Deputy Regional Director
Bureau of Resource Protection
Northeast Regional Office

cc: MassDEP Drinking Water Program/WQA, 1 Winter Street, Boston MA (no attachment)

File name: Y:\DWP Archive\NERO\Georgetown-3105000-Enforcement-2011-11-18

Page 1 of 4

Background

On January 25, 2011, the Northeast Regional Office of the Department of Environmental Protection's Drinking Water Program (MassDEP, or the Department) and the Georgetown Water Department (Georgetown) entered into an Administrative Consent Order with Penalty (ACOP) for violations of the Massachusetts Drinking Water Regulations. Paragraph 9D of the ACOP required that Georgetown submit an engineering report along with a written plan and schedule for implementing the report's recommendations.

On March 9, 2011, MassDEP received a copy of the engineering report. The report included recommendations to address water quality problems and a list of recommended capital improvements. However, the report did not include a schedule for implementing any of the recommendations.

After some technical comments provided by MassDEP, Georgetown's engineer provided a schedule for some of the capital improvements identified in the report dated April 29, 2011. However, MassDEP's review found that the schedule did not specify beginning and end periods for some of the work items, and that the schedule did not include all of the recommendations in the report. MassDEP forwarded those comments to Georgetown and its engineer for clarification.

On July 13, 2011, MassDEP received clarifications from Georgetown. However, the clarifications did not include a schedule detailing the start and completion times for all of the recommendations listed in the engineering report.

Georgetown then submitted another schedule on July 25, 2011. In the submittal, Georgetown requested feedback on the suitability of the format of the revised schedule.

After additional comments and discussion, MassDEP provided more specific guidance on the format and content of the plan and schedule in a letter dated September 21, 2011. Additionally, the Department required that Georgetown provide a plan for monitoring water quality and a mitigation plan to address complaints while different measures were being implemented.

Plan and Schedule Summary

On October 21, 2011, the Department received a letter from Georgetown dated October 20, 2011. In that letter, Georgetown provided the following information:

1. Plan: Georgetown provided a table summarizing the different measures it would be taking to addresses the water quality issues. The measures listed included the items on page 5-15 of the "Water System Study and Improvement Plan" as well as some additional items from the report, along with comments for each of the measures.

2. **Schedule:** Georgetown provided a schedule detailing the beginning and end date for each recommendation. The schedule identifies the planning, design, and implementation/construction times for the different items.
3. **Distribution Monitoring Program:** Georgetown provided a detailed plan for monitoring the water quality in the distribution system so that baseline conditions and changes in water quality can be more quantitatively identified. As described in the letter, that plan consists of monthly monitoring at ten distribution locations, the two tank sites, the point of entry, and the water office for free and total chlorine, pH, temperature, iron, manganese, sulfate, and hydrogen sulfide. This plan meets the requirements of the Department's September 21, 2011 letter.
4. **Distribution System Short Term Mitigation Plan:** In the letter, Georgetown noted that it had implemented measures to mitigate the water quality problems. Actions that Georgetown has taken and will continue to take include cleaning and disinfecting its sources every three years, cleaning and disinfecting its storage tanks, semi-annual flushing, and spot flushing near complaints. Georgetown also noted that it would reduce the use of the source that it believed contributed the most to the water quality problems once some initial work on the other sources has been completed. Georgetown further noted that it may be looking at increasing the turn-over in its storage tanks.

Approval

Based on its review of the information submitted in Georgetown's October 21, 2011 letter, the Department hereby grants its approval of Georgetown's plan and schedule for addressing the water quality issues, subject to the following conditions:

1. **Conditional Items:** For some of the items, Georgetown noted that implementation of some measures depended on the success of earlier measures. In light of the fact that Georgetown has a plan to monitor the effectiveness of any measures taken, the Department is willing to accept the approach of waiting to observe the impact of different measures before implementing additional the measures. Georgetown will need to implement the additional measures in the event that the initial steps do not successfully address the water quality issues unless otherwise approved by the Department.
2. **Distribution Monitoring Program – Quality Control and Recordkeeping** Georgetown shall implement the water quality monitoring program immediately. Georgetown shall complete all sampling and analysis in accordance with standard practices. As part of the plan, Georgetown shall implement quality control measures sufficient to ensure that the sampling and analysis measures are adequate. Georgetown shall maintain all records and analysis results on file for review by the Department on request.
3. **Complaint Log:** Georgetown shall maintain a log of all complaints. The log shall identify the date, location, and nature of the complaint, and any other information Georgetown deems as

necessary. Georgetown shall provide copies of the complaint log upon request of the Department.

4. Distribution System Short Term Mitigation Plan: Georgetown shall continue to implement the mitigation measures noted.

Notwithstanding the above, the Department reserves any and all rights to ensure compliance with the ACOP, including the assessment of civil administrative and/or stipulated penalties.

WATER QUALITY IMPROVEMENTS FOR THE TOWN OF GEORGETOWN

Item #	Project	Priority	Project Estimated Start	Completion
1	Web Road Flushing Hydrant	High	24-May-11	24-May-11 Allows for positive directional flushing
2	Marshall & Duffy Well KOH Chem Feed Wright Pierce Engineering began Design of this project in the Spring of 2010 Awarding of the Construction should be in August 2011	High	Sep-11	Jan-12 Allows for pH adjustment of each well prior to filter plant for better Iron & Manganese removal, Corrosion Control within the Filters and Distribution System With these two wells pH Controlled we should be able to reduce dependency on the Commissioners well and reduce the sulfate issues in the system.
3	Water Quality Fact Sheet	High	Oct-11	Jan-12 Georgetown Water Department has begun assembling data for a Fact Sheet. A meeting to discuss this endeavor with AECOM engineering is set for October 14th. It is our desire to complete the design and have it printed by December 15th, and inserted into the January Water Bills
4	WTP Aeration, cleanwell / backwash supply storage tank and pumping system AECOM Engineers	High	Summer 2011 Spring 2012 Spring Fall 2012 for Construction	Prelim Design Final design Financing Summer 2013 This Project will be the construction of a finished water tank for backwash and to pumping into the system. This will eliminate the severe flow and pressure fluctuations that are now prevalent in the distribution system. This tank could also allow for rechlorination, final pH adjustment aeration of the finished water prior to distribution to help eliminate the sulfur issues in the distribution system.
5	Modify Chemical Feed Systems This will require a new vault and Injection Station on the 12-inch raw water main Changing over the finished lime to Liquid Caustic to further increase pH in the distribution system as necessary to inhibit corrosion and sulfate reduction	High	FY 2012	FY 2013 According to Tonka Filter, moving the Chlorine injection point farther from the Permanganate injection point could make for more efficient iron removal. AECOM is looking into the effectiveness of this and it may be done as part of the Clear Well site work. This may not be necessary after the pH adjustment, pre-filter is operational

Page 2 WATER QUALITY IMPROVEMENTS FOR THE TOWN OF GEORGETOWN

6	Mixing System in Concrete Tank #2	High	Summer of 2012	Prelim Design	<p>This project should be fairly Straight forward. The Type of mixing system has not been determined.</p> <p>After the clearwell is operational, This project should help to Maintain Chlorine Residuals by lowering water age in the tank. We have looked at Solar Bee active mixers, Tide Flex passive mixing or fine bubble mixing/aeration .</p> <p>FOR NOW we have been changing the Tank Level setpoints to achieve greater turnover of both tanks</p>
7&8	Filter Recoating and Media Replacement	Medium	Not yet Determined		<p>These two items seemed more urgent two years ago before the fulltime operation of the KOH pre-filter pH adjustment. The internal pitting of the filters and the breakdown of the GreenSand media by the low pH raw water made us think that system failure was in the near future. We were replacing 10% of the media due to losses every year. The internal ferrus metal structure and the welds showed sighn of wide spread corrosion. Since the addition of the pH pre-treatment. The GreenSand is not breaking down and the internal cirrosion doesnot seem to be progressing at such a rapid rate.</p>
9	Other projects in the Wright Pierce Water System Report are on going.		Annually Spring & Fall		<p>Unidirectional flushing of the distribution system with flows of 5 feet / sec was started in the spring of 2005 and has been done twice annually (except the Spring 2010)</p>
10	Cleaning & Redevelopment		3-5 year intervals		<p>Cleaning and redevelopment of Commissioners Well was completed in the spring of 2010 with a high efficiency pump installed in February of 2011</p>
11	Cleaning & Redevelopment		3-5 year intervals		<p>Cleaning and redevelopment of Duffy's Landing well and the installation of a new high efficiency pump was completed in the Spring of 2011</p>
12	Cleaning & Redevelopment		3-5 year intervals		<p>Cleaning and redevelopment of Marshall well with the installation of a new high efficiency pump and VFD Drive will be completed as part of the Marshall/Duffy Rehabilitation (#2) this year.</p>

Page 3 WATER QUALITY IMPROVEMENTS FOR THE TOWN OF GEORGETOWN

14	Water Storage Facilities	Inspection & Cleaning Was Completed in October 2011	Inspection and cleaning of all three of the existing water storage tanks is being scheduled for the Fall of 2011. Natgun was out in June of 2011 to inspect an area of concrete overlay that has come loose and appears to be delaminating in a large area. The opinion is that the tank is still structurally sound. No evidence that the wall reinforcing wire is exposed.
14	Water Main Cleaning	This may not e required once the ph and flow surges are bettercontrolled	This may require cutting into the water system to install launch or intrty sites throughout the system. Recent construction removal of water main did not show signs of excessive build up. Chlorination & Flushing may preclude the need for mechanical cleaning.
15	Ortho Phosphate or Silicate Addition	This may promote biofilm growth and turburculation of the water mains	This should be used as a last resort if the pH Chlorination and flushing program fail to reduce the Iron, Manganese, Sulfate, Sulfide and odor complaints.
EFFECTIVENESS EVALUATION			Georgetownhas been collecting sample data for a number of years throughout the system. The Water Department has selected 12 sample sites to be sampled on a monthly basis to track changes in Iron, Manganese, Sulfate, pH, Free & Total be able to track changes in complaint type and frequency.
12 sites have beenselected around Georgetown. See the enclosed map.			To be determined
			On going

February 14, 2013

Mr. Nicholas Zessoules
MADEP Northeast Region (NERO)
Drinking Water Program
205B Lowell Street
Wilmington, MA 01887

Subject: Georgetown, MA, Open Enforcement/Inspections Actions, Proposed Water System Modifications

Dear Mr. Zessoulis:

Georgetown's Water Superintendent, Mr. Glenn Smith, has asked us to provide you information relative to the open enforcement item "jar tests and recommendations" on a PWS comprehensive report dated January 2, 2013. We have included jar test results from March 2, 2012, but thought that it would be helpful if we also provided a summary of jar test findings and a description of some of the recommendations and decisions that have been made following the submission of the jar test information.

- The jar testing showed that the sodium hypochlorite being used is effective for oxidizing the iron present in the raw water to a filterable form and also that the potassium permanganate being used is effective in oxidizing the manganese present in the raw water to a filterable form. Sodium hypochlorite alone will not oxidize the manganese. A 60-second oxidation time for sodium hypochlorite is recommended prior to the addition of potassium permanganate. Adding sodium hypochlorite prior to potassium permanganate addition provides less permanganate demand as well as more flexibility in the potassium permanganate dosing, thus reducing overall annual chemical costs. A polymer could be used to enhance filtration, but experience with other communities has showed that filtration run time can be significantly reduced. Additional details are provided in the attached memorandum.
- In May of 2012, AECOM provided the Georgetown Water Department with a technical memorandum regarding improving distribution system water quality that recommended the following initial actions:
 - Construction of a backwash water storage/treated water storage tank and pumping station adjacent to the existing WTP as detailed in our November 2011, Technical Memorandum.
 - Installation of a control valve at the elevated storage tank, or elimination of the elevated storage tank if permitted by system hydraulics. The ability to eliminate of the elevated storage tank and maintain adequate pressures at higher elevations could be verified by isolating the elevated tank from the system during warmer weather (so freezing does not occur) and measuring system pressures.

- Construction of a new chemical injection vault for sodium hypochlorite on the raw water main between the wells and the WTP. Jar testing showed that this modification will decrease the amount of potassium permanganate needed for manganese oxidation.
- In a July of 2012 meeting, the Georgetown Water Department Superintendent and Board of Water Commissioners (BWCs) asked AECOM if the recommendations from the May 2012 technical memorandum would solve all of Georgetown's finished water quality problems. AECOM responded that a clarifier may still be needed upstream of the filters. The raw water iron, manganese, and total organic carbon concentrations are increasing to levels where treatment with greensand filtration alone may not provide acceptable finished water quality. Furthermore, the cost to add a clarifier and a storage tank for backwash water and finished water to the existing WTP would approach the cost of a new WTP. The BWCs decided that they wanted AECOM to evaluate the construction of a new WTP rather than modify the existing WTP. The Town retained AECOM to prepare a technical memorandum that would:
 - Evaluate treatment process options appropriate for Georgetown's raw water quality
 - Provide recommendations for the following:
 - treatment process
 - treatment chemicals
 - treatment plant location
 - Provide a project cost estimate
- In December of 2012, AECOM provided the Town with a technical memorandum that recommended that the existing WTP be replaced by a new WTP that includes dissolved air flotation (DAF) clarification, and gravity filtration. Pilot testing of the DAF process along with a package adsorption clarifier was also recommended. AECOM recommended that the new WTP be located on the same site as the existing WTP.
- In January of 2013, the Georgetown BWCs decided that they will prepare a warrant article for the spring 2013 town meeting, requesting a transfer of retained earnings for the purpose of pilot testing and preliminary design of a new WTP. The pilot testing results and preliminary design documents will be used to prepare a project cost estimate for a new WTP. The BWCs then plans to prepare a warrant article for either a special fall 2013 or spring 2014 town meeting requesting that funds be raised and appropriated for the final design and construction of a new WTP. The new WTP could be completed by the end of 2015.

We trust that the information provided satisfies the requirement for Jar Tests and Recommendations in the PWS comprehensive report and also provides you some insight as to the intentions of the Georgetown Water Department. If you have any questions or require additional information, please do not hesitate to contact me.

Very truly yours,
AECOM Technical Services

A handwritten signature in black ink, appearing to read "Stephen J. DeFrancesco". The signature is fluid and cursive, with the first name "Stephen" and last name "DeFrancesco" clearly legible.

Stephen J. DeFrancesco, P.E.
Senior Project Manager

cc: Glenn Smith
Georgetown Board of Water Commissioners

enc.

Memorandum

To Glenn Smith, Georgetown, MA Water Superintendant Page 1

CC Reidar Bomingen

Subject Jar Test at Water Treatment Facility

From Stephen DeFrancesco

Date March 2, 2012

Introduction

AECOM was requested by the Georgetown, MA Water Department (Town) to jar test the influent water to the water treatment facility (WTF) to determine the following:

1. Can sodium hypochloride be used to reduce the current potassium permanganate dosing costs and oxidize iron and manganese?
 - a. If so, what would be the parameters to provide successful treatment?
2. Would a coagulant or polymer aid in the removal process of iron and manganese through filtration?
 - a. If so, what would be the dosing conditions?
3. Can the pH be raised in one step (i.e. prior to the filters) instead of a two step process of prior to the filter and after the filter?

Four jar tests were run to provide insight to these questions.

Materials and Methods

A six paddle, variable speed jar testing machine from Phipps & Bird with square 2L jars was used. The following chemicals in Table 1 were put in the jar test. The chemicals were added in order as shown in the jar test data sheets (Appendix A). Since the proposed chemicals are to be injected into turbulent pipe flow, the speed of the mixer was set at maximum which ranged from 250 to 300 rpms.

Table 1: Chemicals Used in Jar Test

Type	Name	Solution Strength	Notes
Base	KOH	45% w/w	Added at each well house prior to the WTF
Oxidant	NaOCl	12% w/w solution diluted to 1.5 g/L stock	From WTF day tank
Oxidant	KMnO ₄	1.5 g/L stock	From WTF dry buckets
Coagulant	ACH	PHI-23180 - Not provided (S.G. = 1.34)	From Pristine Water Solutions

Polymer	Nonionic	N-1986 - Not provided (S.G. = 1.0)	From Pristine Water Solutions
---------	----------	------------------------------------	-------------------------------

Total iron and manganese were analyzed using the FerroVer and PAN method for a HACH DR 4000 spectrophotometer. A 0.45 µm filter and filter apparatus was used to determine dissolved or unfilterable iron and manganese. Free chlorine was analyzed using the DPD method for a HACH DR 4000 spectrophotometer. Poland Springs distilled water was used for making the dilutions.

The initial oxidant dosing was based upon the equations in Table 2. Based on Table 2 above and influent water quality in Table 3 below, the estimated minimum sodium hypochlorite dosing was 5.0 mg/L, and potassium permanganate as 7.0 mg/L based. Jar testing revised these values up and down as discussed later in this memorandum.

Metal/Oxidant	Reaction	Stoichiometry
Fe(2+)		
	$\text{HOCl: } 2\text{Fe}^{2+} + \text{HOCl} + 5\text{H}_2\text{O} \rightarrow 2\text{Fe}(\text{OH})_3(\text{s}) + \text{Cl}^- + 5\text{H}^+$	0.64 mg HOCl/ mg Fe
	$\text{KMnO}_4: 3\text{Fe}^{2+} + \text{MnO}_4 + 2\text{H}_2\text{O} \rightarrow 3\text{Fe}(\text{OH})_3(\text{s}) + \text{MnO}_2 + 5\text{H}^+$	0.94 mg KMnO ₄ /mg Fe
Mn(2+)		
	$\text{HOCl: } \text{Mn}^{2+} + \text{HOCl} + \text{H}_2\text{O} \rightarrow \text{MnO}_2(\text{s}) + \text{Cl}^- + 3\text{H}^+$	1.30mg HOCl*/mg Mn
	$\text{KMnO}_4: 3\text{Mn}^{2+} + 2\text{MnO}_4 + 2\text{H}_2\text{O} \rightarrow 5\text{MnO}_2(\text{s}) + 4\text{H}^+$	1.92 mg KMnO ₄ /mg Mn

Table 2 – Oxidant Dosing Scheme

Influent Water Quality to WTF

The influent water quality and current full scale dosing scheme at the WTF is provided in Table 3 and Table 4. The wells provide water with high levels of iron and manganese. In additional, recent values for total organic carbon (not provided here) have also been high (~5 mg C/L).

Table 3: Influent Water Quality to the WTF

Parameter	Value
Total Iron, mg Fe/L	4.6
Total Manganese, mg Mn/L	1.1
pH, S.U.	7.0
Temperature, C	10.9
Turbidity, NTU	0.8

Table 4: Current Chemical Dosing and Flows at WTF

Parameter	Value
Sodium Hypochlorite	6 mg/L
Potassium Permanganate	3 to 4 mg/L
Potassium Hydroxide	Adjust up to 7.0
Flow from Marshall Well	200 gpm
Flow from Duffy Well	700 gpm

The water entering the WTF is conditioned at the well houses with 45% w/w potassium hydroxide to raise the pH to 7.0 and reduce the corrosiveness of the raw water.

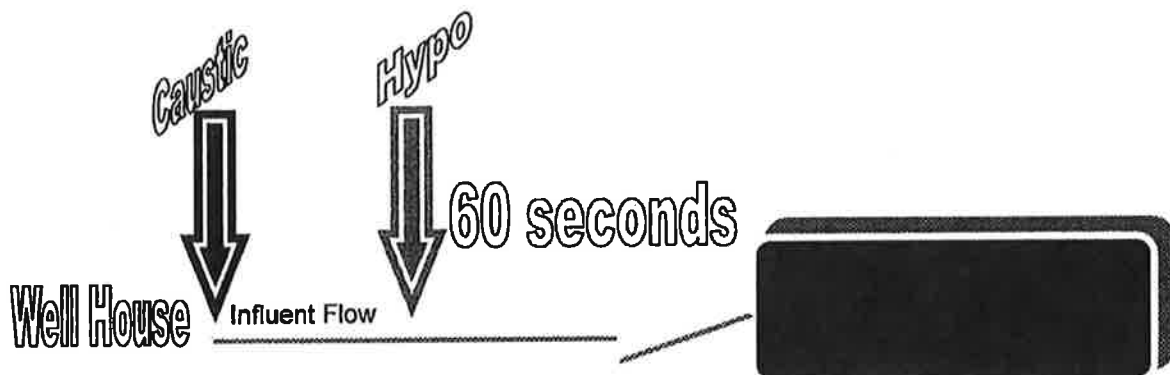
Jar Tests

Test No. 1

Jar Test No. 1 explored the time required to oxidized iron with sodium hypochlorite. The underlying assumption was that if a 0.45 μm filter removed the iron, the influent iron had been oxidized to the particulate state and was not organically bound. The initial test demonstrated that a dose of 6.5 mg/L of sodium hypochlorite was required to obtain a residual chlorine value of 0.16 mg/L. The water immediately turned yellow upon addition of sodium hypochlorite, but no particles of iron could be seen with the naked eye.

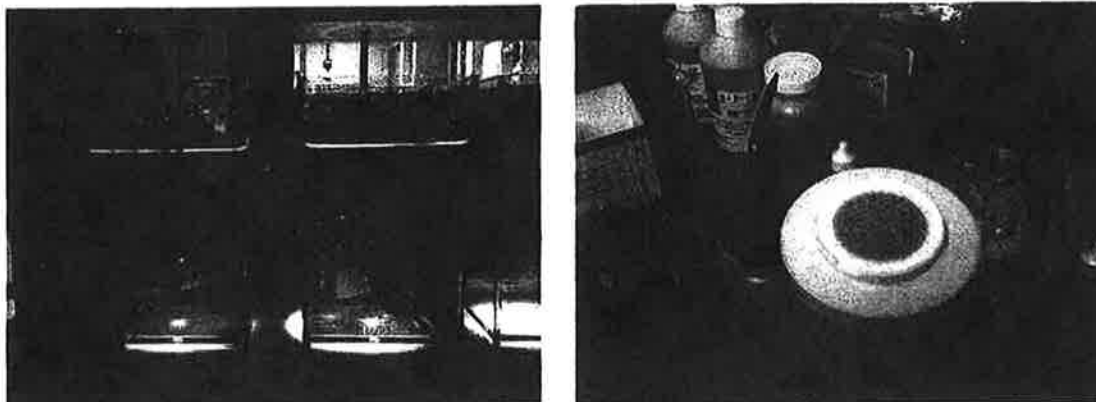
After ten seconds of contact time with the sodium hypochlorite, a sample was taken from the jar, filtered, and tested for iron. After the sample was filtered, the residual iron was determined to be 0.24 mg/L.

Figure 1: Order of Chemical Dosing for Jar Test No. 1



This result indicated that iron could be oxidized with sodium hypochlorite without the aid of potassium permanganate and that 10 seconds at a minimum was required for contact time. The results also suggested the particulate iron could be removed by filtration.

Figure 2: A.) Jar After Sodium Hypochlorite Added, B.) Filter Showing Iron on Filter



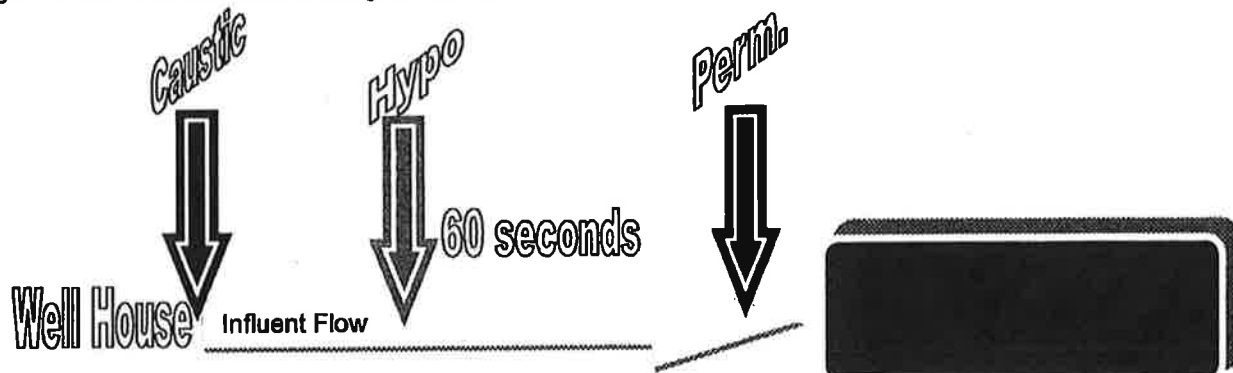
Test No. 2

Jar Test No. 2 tested if sodium hypochlorite could oxidize manganese without the use of potassium permanganate. The estimate minimum time available from the well house to the WTF was 60 seconds. Twenty, forty, and sixty seconds were tested to examine the performance of sodium hypochlorite on oxidizing manganese. The results show that approximately 60% of the influent manganese remained in all cases after filtration of the sample. Thus, the results show that sodium hypochlorite at this pH will unlikely oxidize manganese in the time provided and will require the greensand media and/or potassium permanganate.

Test No. 3

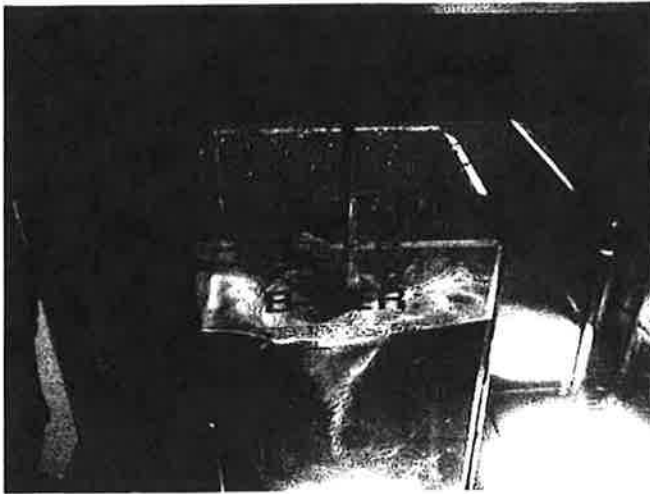
The goal of Jar Test No. 3 was to determine if manganese could be oxidized by a lower potassium permanganate dose than what is currently being dosed at the WTF.

Figure 3: Order of Chemical Dosing for Jar Test No. 3



The sodium hypochlorite was dosed 60 seconds prior to the potassium permanganate being added. Potassium permanganate was then dispensed and then allowed to react in the jar for 10 minutes (a conservative residence time provided by Glenn Smith). The first trial added 2.0 mg/L of potassium permanganate.

Figure 4: Characteristic Brown Color after KMnO_4 Added

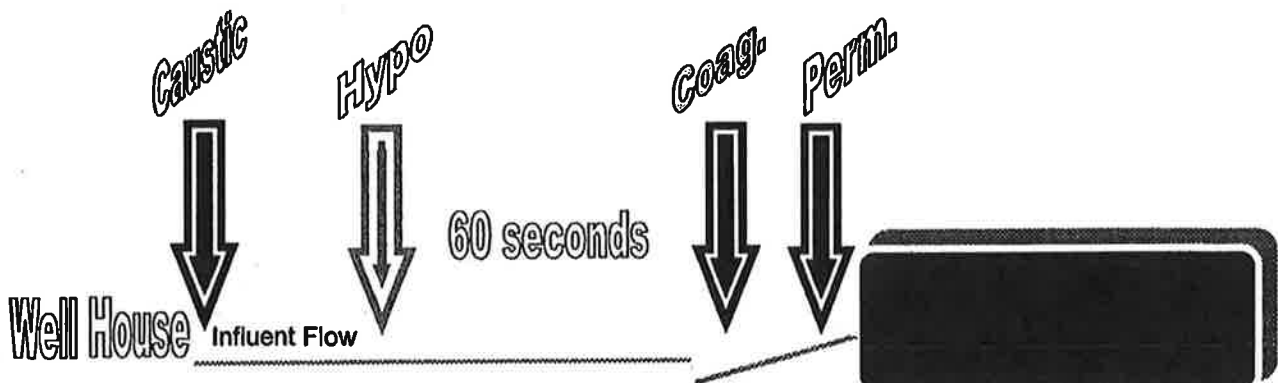


This resulted in a sample slightly colored purple after the sample was filtered (i.e. overdose). The manganese in the filtered sample was 0.46 mg Mn/L. The second trial dose was 1.2 mg/L of potassium permanganate. This resulted in no pink water after the sample was filtered. The residual manganese was 0.020 mg Mn/L. The results suggested that dosing the sodium hypochlorite first followed by a short detention time and then adding potassium permanganate will allow the Town to have more control over their current potassium permanganate requirements.

Test No. 4

Jar Test No. 4 was a preliminary test to determine the performance of adding either a coagulant, a coagulant with a nonionic polymer, or just the nonionic polymer itself. A dose of 7 (wet) mg/L of aluminum chlorohydrate (ACH) was dosed by itself in a set of jars, 7 (wet) mg/L of ACH was dosed with 0.25 (wet) mg/L of non-ionic polymer in a second set of jars, and 0.25 (wet) mg/L of non-ionic polymer in the last jar.

Figure 5: Order of Chemical Dosing for Jar Test No. 4



Sodium hypochlorite was dosed at 6.5 mg/L with a 60 second contact time, followed by the coagulant and/or polymer, and lastly the potassium permanganate with a 10 minute contact time. The mixer was reduced down from 250 rpms to 60 rpms to encourage flocculation. The first floc was visible after about 3 to 4 minutes of flocculation mixing in those jars with polymer aided. The floc tended to be medium in size. The jars with just coagulant dosed tended to have a smaller pin-floc particle which took longer to form. None of the jars settled well (i.e. floc tended to float) and the yellow color from oxidized iron remained. The best jar from visual inspection looked to be the jar with just polymer only addition. A brief filter test suggested that the sample with polymer addition is filterable (i.e. all the solids are caught on the filter).

The results here suggest that polymer only addition may provide a floc particle which is more readily filterable and perhaps more shear resistant, although at the possible expense of filter headloss buildup. More testing would be required to confirm these results.

Summary

In summary, the jar testing indicated that sodium hypochlorite could be used to oxidize iron to a filterable state, but not manganese to any appreciable extent in the timeframe given. A 60 second oxidation time for iron is recommended prior to the addition of potassium permanganate.

Adding sodium hypochlorite prior to potassium permanganate addition provides less permanganate demand as well as more flexibility in the potassium permanganate dosing, thus reducing overall annual chemical costs. The jar test results here suggest the potassium permanganate dose could be reduced from a high of 4.0 mg/L to approximately 1.2 mg/L. A word of caution. It is best to keep a residual level of chlorine through the filter, typically 0.2 mg Cl_2/L as free or higher to keep the filter bed in an active state. It is also cautioned that high levels of manganese can interfere with chlorine measurements with the DPD method. The operator should check the chlorine residual periodically with other chlorine methods such as a titration method.

Preliminary testing with coagulant and polymer suggest that the nonionic polymer alone performed best in jar testing. However the jar test did not have a scaled version of the filters available to test the effect of adding the polymer to the filters. It is recommended that a small scale filter unit be obtained from manufacturer or built to test the effects of the polymer on filter operation and maintenance.

Lastly, testing the influent water at a high pH (7.5 to 8.0) was not performed. However, literature suggests that most of the physical processes involved in the jar test will be enhanced with the a slight increase in the pH from 7.0 to 7.5, thus allowing for a one time addition of caustic instead of incremental addition. Again, jar testing with a small filter column would further bear out this assessment as a table top evaluation is not available.



Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Drinking Water Program

X255138

Transmittal Number

BRP WS Application

3105000

Facility ID# (if known)

For Drinking Water Program (Water Supply) Permits or Approvals

A. Application

1. Is this application for ☒ an Original or ☐ a Resubmittal?

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



2. Applicant:

Georgetown Water Department

1 Moulton Street

Name

Address

Georgetown

MA

01833

Glenn F Smith

978-352-5738

City

State

Zip

Contact

Telephone

3. Consultant:

AECOM Technical Services, Inc.

701 Edgewater Drive

Name

Address

Wakefield

MA

01880

William Clunie

781-224-6145

City

State

Zip

Contact

Telephone

B. Permit

Please check the permit or approval for which you are applying:

Zone II Determination for Existing Sources

- ☐ BRP WS 07 Approval to Conduct Pump Test for Zone II Delineation
☐ BRP WS 08 Approval of Zone II Delineation

New Technology

- ☐ BRP WS 11 Minor New Technology Approval; where no field test required
☐ Drinking Water Additive
☐ Cross Connection Device
☐ Water Vending Machine
☐ Other (specify):
☐ BRP WS 12 Major New Technology Approval; where field testing is required
☐ BRP WS 27 New Technology with Third-party Approval
☐ BRP WS 28 Vending Site/Source Prototype
☐ BRP WS 31 Vending and POU/POE Devices with Third-party Approval

New Source Approvals <70 gpm

- ☐ BRP WS 13 Exploratory Phase, Site Examination, Land Use Survey and Approval to Conduct Pumping Test
☐ BRP WS 15 Pumping Test Report Approval and Approval to Construct Source
☐ BRP WS 37 Approval of Transient Non-Community Source Less than 7 Gallons per Minute (combines BRP WS 13 and BRP WS 15 submittals)

New Source Approvals = or > 70 gpm

- ☐ BRP WS 17 Exploratory Phase, Site Examination, Land Use Survey, and Conduct Pumping Test
☐ BRP WS 19 Pumping Test Report Approval
☐ BRP WS 20 To Construct Source

Water Treatment Approvals

- ☐ BRP WS 21A To Conduct Pilot Study < 40,000 gpd
☒ BRP WS 21B To Conduct Pilot Study = or > 40,000 gpd and < 200,000 gpd
☐ BRP WS 21C To Conduct Pilot Study = or > 200,000 gpd and < 1 mgd
☐ BRP WS 21D To Conduct Pilot Study = or > 1 mgd
☐ BRP WS 22A Pilot Study Report < 40,000 gpd
☐ BRP WS 22B Pilot Study Report = or > 40,000 gpd and < 200,000 gpd
☐ BRP WS 22C Pilot Study Report = or > 200,000 gpd and < 1 mgd
☐ BRP WS 22D Pilot Study Report = or > 1 mgd
☐ BRP WS 23A To Construct Facility < 40,000 gpd
☐ BRP WS 23B To Construct Facility = or > 40,000 gpd and < 200,000 gpd
☐ BRP WS 23C To Construct Facility = or > 200,000 gpd and < 1 mgd
☐ BRP WS 24 To Construct Facility = or > 1 mgd
☐ BRP WS 25 Treatment Facility Modification
☐ BRP WS 29 Water Treatment: Chemical Addition Retrofits of Water Systems > 3,300 people
☐ BRP WS 30A Vending Installation Approval
☐ BRP WS 30B POU/POE Installation Approval
☐ BRP WS 34 Water Treatment: Chemical Addition Retrofits of Water Systems = or < 3,300 people
☐ BRP WS 35A Multiple Vending Installation Approval
☐ BRP WS 35B Multiple POU/POE Installation Approval

Water Quality Assurance

- ☐ BRP WS 26 Sale or Acquisition of Land for Water Source
☐ BRP WS 36 Abandonment of Water Source

Distribution System Modifications

- ☐ BRP WS 32 Systems > 3,300 people
☐ BRP WS 33 Systems = or < 3,300 people



Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Drinking Water Program

BRP WS Application

For Drinking Water Program (Water Supply) Permits or Approvals

X255138

Transmittal Number

3105000

Facility ID# (if known)

C. Certification

"I certify, under penalty of law, that this application and all attachments were prepared under my supervision, in accordance with a system designed to ensure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information submitted in this application, the information submitted is, to the best of my knowledge and belief, true, accurate and complete."

William Clunie

Authorized Signature

William Clunie

Print Name

3/11/13

Date

Technical Manager

Position/Title



Enter your transmittal number

X255138

Transmittal Number

Your unique Transmittal Number can be accessed online: <http://mass.gov/dep/service/online/trasmfrm.shtml> or call MassDEP's InfoLine at 617-338-2255 or 800-462-0444 (from 508, 781, and 978 area codes).

Massachusetts Department of Environmental Protection**Transmittal Form for Permit Application and Payment**

1. Please type or print. A separate Transmittal Form must be completed for each permit application.

2. Make your check payable to the Commonwealth of Massachusetts and mail it with a copy of this form to: DEP, P.O. Box 4062, Boston, MA 02211.

3. Three copies of this form will be needed.

Copy 1 - the original must accompany your permit application. **Copy 2** must accompany your fee payment. **Copy 3** should be retained for your records

4. Both fee-paying and exempt applicants must mail a copy of this transmittal form to:

MassDEP
P.O. Box 4062
Boston, MA
02211

*** Note:**
For BWSC Permits, enter the LSP.

A. Permit Information

BRPWS 21B

Water Quality Assurance and Treatment

1. Permit Code: 7 or 8 character code from permit instructions

2. Name of Permit Category

Approval to Conduct Pilot Study (40,000 - 200,000 gpd)

3. Type of Project or Activity

B. Applicant Information - Firm or Individual

Georgetown Water Department

1. Name of Firm - Or, if party needing this approval is an individual enter name below:

Smith

Glenn

F

2. Last Name of Individual

3. First Name of Individual

4. MI

1 Moulton Street

5. Street Address

Georgetown

MA

01833-1943

978-352-5738

6. City/Town

7. State

8. Zip Code

9. Telephone #

10. Ext. #

Glenn Smith

gsmith@georgetownma.gov

11. Contact Person

12. e-mail address (optional)

C. Facility, Site or Individual Requiring Approval

West Street Water Treatment Plant

1. Name of Facility, Site Or Individual

75 West Street

2. Street Address

Georgetown

MA

01833-1943

978-352-5730

3. City/Town

4. State

5. Zip Code

6. Telephone #

7. Ext. #

3105000

8. DEP Facility Number (if Known)

9. Federal I.D. Number (if Known)

10. BWSC Tracking # (if Known)

D. Application Prepared by (if different from Section B)*

AECOM Technical Services, Inc.

1. Name of Firm Or Individual

701 Edgewater Drive

2. Address

Wakefield

MA

01880

781-224-6145

3. City/Town

4. State

5. Zip Code

6. Telephone #

7. Ext. #

William Clunie

8. Contact Person

9. LSP Number (BWSC Permits only)

E. Permit - Project Coordination

1. Is this project subject to MEPA review? ☐ yes ☒ no
If yes, enter the project's EOE file number - assigned when an Environmental Notification Form is submitted to the MEPA unit:

EOEA File Number

F. Amount Due**Special Provisions:**

1. ☒ Fee Exempt (city, town or municipal housing authority)(state agency if fee is \$100 or less).
There are no fee exemptions for BWSC permits, regardless of applicant status.
2. ☐ Hardship Request - payment extensions according to 310 CMR 4.04(3)(c).
3. ☐ Alternative Schedule Project (according to 310 CMR 4.05 and 4.10).
4. ☐ Homeowner (according to 310 CMR 4.02).

DEP Use Only

Permit No:

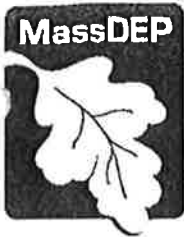
Rec'd Date:

Reviewer:

Check Number

Dollar Amount

Date



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Northeast Regional Office • 205B Lowell Street, Wilmington MA 01887 • 978-694-3200

DEVAL L. PATRICK
Governor

TIMOTHY P. MURRAY
Lieutenant Governor

RICHARD K. SULLIVAN JR.
Secretary

KENNETH L. KIMMELL
Commissioner

May 28, 2013

Glenn Smith
One Moulton Street
Georgetown, MA 01833-1943

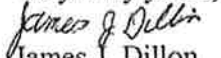
Re: City/Town: **GEORGETOWN**
PWS Name: Georgetown Water Department
PWS ID #: 3105000
Program: System Modifications
Action: Pilot Test Approval
Activity No.: X255138

Dear Mr. Smith:


Please find attached an outline of the Department's findings for a review of the proposal to conduct a pilot study for the removal of Iron and Manganese. The review was completed in accordance with Massachusetts Drinking Water Regulations 310 CMR 22.00. With this notification, MassDEP approves with specific conditions your proposal to conduct the pilot study as outlined in your submittal.

Please note that the signature on this cover letter indicates formal issuance of the attached document. If you have any questions regarding this letter, please contact James J. Dillon at (978) 694-3231.

Very truly yours,


James J. Dillon
Drinking Water Program
Northeast Regional Office

Very truly yours,


Thomas Mahin
Section Chief Drinking Water
Northeast Regional Office

cc: William Clunie, PE, AECOM, 701 Edgewater Drive, Wakefield, MA 01880
Nicholas Zessoules, DEP-NERO
File name: Y:\DWP Archive\NERO\ Georgetown-3105000-Pilot Approval-2013-04-19

The Metropolitan Boston/Northeast Regional Office of the Department of Environmental Protection's Drinking Water Program (MassDEP or the Department) has received and reviewed the Pilot Study Proposal for the removal of iron and manganese from the three (3) wells that supply the town of Georgetown ("Georgetown"). The permit application, BRP WS 21B- Pilot Study Protocol for Iron and Manganese Removal from Groundwater Wells, was prepared by AECOM of Wakefield, Massachusetts and bears the signature of William Clunie P.E., a Massachusetts Registered Professional Engineer.

MassDEP received the plans and specifications for the work on March 14, 2013 along with a permit application, Transmittal # X255138.

The Georgetown Water Department (Georgetown) provides potable water to approximately 8,000 customers from three (3) wells: Duffy's Landing, Marshall, and Commissioners. ***None of these wells at this time are considered to be under the influence of surface water.*** The pH of the well water is adjusted with 45% potassium hydroxide (KOH) before entering the groundwater treatment plant. The treatment plant consists of two (2) parallel TONKA pressure greensand filters. Potassium permanganate and sodium hypochlorite are used to oxidize dissolved iron and manganese.

The combined raw water quality entering the water treatment plant over the past four (4) years shows an iron concentration of 3.6 parts per million (ppm) to 4.7 ppm; a manganese concentration of approximately one (1) ppm; sulfate concentration of 16 ppm to 20 ppm; and a total organic carbon concentration of two (2) ppm to seven (7) ppm. **Please note that the raw water concentration of sulfate at the Commissioner's well has been as high as ninety-four (94) ppm.**

The pilot will be conducted during the summer of 2013 on a combined effluent of three (3) wells to maximize the raw water worse case blend. The following two (2) technologies will be piloted: dissolved air flotation (DAF) followed by greensand plus filtration and Pacer II Dual Treatment System which is a package adsorption clarifier followed by greensand plus filtration.

For both technologies, the raw water will be aerated. The aeration system is designed to remove carbon dioxide, hydrogen sulfide, and ammonia. Then the pH will then be adjusted with 45% KOH.

For the DAF pilot:

A coagulant as well as oxidants (sodium hypochlorite and/or potassium permanganate) will be injected into the aerated water before a two (2) stage flocculation unit which will have fourteen (14) to thirty (30) minutes of detention. Next there will be the DAF unit where the floc will attach to the bubbles and float to the top of the unit to be skimmed off. The DAF unit will remove oxidized iron and TOC. Following the DAF unit, there will be a filter composed of anthracite as well as greensand plus for removal of manganese. The water will be injected with a solution of sodium hypochlorite before entering a baffled clear well.

Package Adsorption Clarifier/Filter pilot:

Alum will be injected into the aerated pH adjusted raw water. A static mixer will then follow. The water then will flow up through the adsorption clarifier. The clarified water will then flow by gravity

through a filter composed of anthracite and greensand plus. The water will be injected with a solution of sodium hypochlorite before entering a baffled clear well.

There will a start-up and optimization run followed by a series of six (6) separate pilot runs on each of the above-mentioned technologies. Finally there will be a final optimized run. Jar testing will be utilized to determine initial chemical doses.

Water quality sampling and process monitoring shall be performed as specified in the table below.

Parameter	Source Water	DAF clarified	AC clarified
Aluminum *	X	X	X
Sanitary Group +	X	X	X
Alkalinity	X	X	X
Arsenic	X	X	X
Iron	X	X	X
Manganese	X	X	X
Total Organic Carbon (TOC)	X	X	X
Total Coliform Bacteria	X	X	X
Carbon dioxide	X		

The effluent from the greensand plus filters will be analyzed for sanitary group, arsenic, iron, manganese, total Coliform bacteria, carbon dioxide, and TOC. The effluent will also be analyzed for TTHM/HAA5 maximum formation with a seven day (7) day holding time and high residual free chlorine concentration. There will also be simulated distribution system formation potential (disinfection by-products) using the maximum residence time in the water distribution system.

- * Only if Alum is used
- + Sodium, calcium, magnesium, potassium, hardness, sulfate, nitrate, nitrite, and ammonia

This approval is subject to the following additional conditions:

Pilot Study Test Modifications: If any changes are made to the pilot study proposal as submitted to the Department, Georgetown shall notify the Department in writing prior to making changes.

1. The pilot study shall include all three wells.
2. The Department considers the pilot study to be component of an overall evaluation of the distribution water quality complaints which were the subject of an Administrative Consent Order with Penalty (ACOP-NE-11-5D001). In addition, Georgetown has submitted a scope of work to the Department dated May 28, 2013 that will evaluate methods to reduce water age and increase disinfection residuals throughout the distribution system. The Department will be reviewing that correspondence and providing comments to Georgetown via a separate letter. The Department considers both the pilot study and the additional distribution system evaluation work described above to be parts of the plan and schedule as required by ACOP-NE-11-5D001.
3. Prior to including any of the processes proposed in bid or construction documents or implementing the process on a permanent basis, Georgetown must submit an Engineering Report to the Department for its review and approval for any recommended treatment process. The Engineering Report may be incorporated into the final Pilot Test Report. The report shall identify process performance and operating characteristics, anticipated range of influent water quality, treated water quality characteristics (e.g. finished water pH, finished water free chlorine residual, etc.), design parameters, and a complete residuals analysis, to include an estimate of volumes and disposal requirements, with references to the information collected during the pilot test and the methodology of how the parameters were determined from the pilot test data.
4. Field Water Quality Monitoring: The PWS may collect and analyze samples in the field. Prior to and during the piloting period, all instruments and other monitoring equipment to be used for field analysis shall be calibrated, maintained and operated in accordance with the manufacturer's recommendations, and at least one sample per week shall be split with duplicate analyses run by a state certified laboratory. The results of all water quality monitoring shall be submitted to the Department.
5. Laboratory Testing and Reporting: All laboratory analysis shall be performed at State certified laboratories using Department approved methods. All laboratory reports shall be prepared on State approved forms. Copies of all reports shall be submitted to the Department as part of the final pilot test report.
6. Pilot Test Report: Georgetown shall submit a Pilot Study Report to the Department for its review and approval before any construction is started. The pilot study report shall address the items listed under the general section and section specific to iron and manganese piloting of Department Policy 90-04. **Further the pilot must address simultaneous compliance issues such as Lead & Copper as well as Stage 2 compliance.** During the pilot study, Georgetown shall also evaluate its waste stream characteristics including quality and quantity to determine whether the modifications will result in compliance with their NPDES permit.

7. If chlorine is used as an oxidant in any part of the treatment train, all discharges to the environment will be dechlorinated with a dechlorination agent such as sodium thiosulfate, sodium bisulfite, etc. All discharges must have no detectable chlorine residual.
8. You are required to notify the Northeast Regional Office at least seven (7) days prior to the start of the pilot study. Further you are required to submit to the Department for its review and approval an engineering sheet and description of the backwash treatment process stamped by a Massachusetts PE at least two (2) weeks prior to the start-up of the pilot study.
9. All waste from pilot will be treated and disposed in compliance with all applicable Department regulations. Georgetown must maintain compliance with their NPDES permit.
10. The aerated water shall be sampled as least once to determine removal of carbon dioxide, hydrogen sulfide, and ammonia.

The Department reserves the right to require any modifications of this pilot study approval based on the results of the pump test water quality sampling or the results of this study.

Further, this approval does not relieve Georgetown obligation to obtain and comply with all other necessary permits and approvals.

The Department understands that Georgetown receives numerous complaints from its customers regarding taste, odor, and color. Georgetown believes that the odor and possibly the taste issues are related to the level of sulfate in the raw water and the complaints are more prevalent when Commissioner's well is in service. The Department strongly recommends that the source of these odor and taste complaints be determined and that the new proposed water treatment system will address these issues.

Georgetown is reminded that the distribution monitoring plan approved by the Department on November 18, 2011 pursuant to ACOP-NE-11-5D001 unless otherwise approved in writing by the Department. The plan consists of monthly monitoring at multiple locations for free and total chlorine, pH, temperature, manganese, sulfate and hydrogen sulfide.



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Northeast Regional Office • 205B Lowell Street, Wilmington MA 01887 • 978-694-3200

DEVAL L. PATRICK
Governor

RICHARD K. SULLIVAN JR.
Secretary

KENNETH L. KIMMELL
Commissioner

July 16, 2013

Glenn Smith
Georgetown Water Department
1 Moulton Street
Georgetown, MA 01833

Re: City/Town: Georgetown
PWS Name: Georgetown Water Department
PWS ID #: 3105000
Program: Enforcement
Action: Update of Approved Plan and Schedule
Activity No.: ACOP-NE-11-5D001

Dear Mr. Smith:

The Department has received your letter dated May 28, 2013 outlining a plan to conduct a comprehensive re-evaluation of the water system.

As part of the terms of the above referenced an Administrative Consent Order with Penalty, Georgetown was required to submit a plan and schedule for implementing recommendations to address water quality concerns.

The Department is requesting that Georgetown provide an update on its plan and other required actions as part of its system evaluation, as the letter indicates that the plan may be changing.

Notwithstanding the above, the Department reserves any and all rights to ensure compliance with the ACOP, including the assessment of civil administrative and/or stipulated penalties.

If you have any questions regarding this letter, please contact Nick Zessoules at (978) 694-3230.

Very Truly Yours,

Rachel Freed
Deputy Regional Director
Bureau of Resource Protection
Northeast Regional Office

cc: MassDEP Drinking Water Program/WQA, 1 Winter Street, Boston MA (no attachment)

File name: Y:\DWP Archive\NERO\Georgetown-3105000-Enforcement-2013-07-16

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Background

On June 11, 2008, Northeast Regional Office of the Department of Environmental Protection's Drinking Water Program (MassDEP, or the Department), issued report on a sanitary survey conducted on the Georgetown Water Department (Georgetown). In that report, the Department noted that Georgetown reported a significant number of complaints related to discoloration and odors and that Georgetown had hired a consulting engineer to evaluate the problem and develop a corrective action plan. The Department also noted that there was a significant drop-off in the chlorine residual from the water treatment plant to the majority of the distribution sites and recommended that Georgetown evaluate the drop in chlorine residual.

On January 25, 2011, the Department and Georgetown entered into an Administrative Consent Order with Penalty (ACOP) for violations of the Massachusetts Drinking Water Regulations. Paragraph 9D of the ACOP required that Georgetown submit an engineering report on water quality issues identified in the sanitary survey, along with a written plan and schedule for implementing the report's recommendations.

On October 21, 2011, the Department received a letter from Georgetown outlining its plan and schedule and reflecting guidance and comments provided by the Department on the initial report submittal and subsequent submittals by Georgetown.

In a letter dated November 18, 2011, the Department approved Georgetown's plan and schedule, with the conditions that Georgetown implement additional measures to address immediate concerns.

Subsequent to that approval, the following have occurred:

- On January 27, 2012, the Department granted approval to operate modifications to the Marshal Well. As a condition of approval, the Department required Georgetown to establish recommended pH levels for filtration and for the water in the distribution system
- On November 9, 2012, the Department received a letter from Georgetown provided to outline progress made on addressing the water quality issues. In the letter, Georgetown noted that their consulting engineer was proposing to replace the water treatment plant rather than construct the upgrades outlined in the approved plan in order to better address water quality concerns.
- A technical memorandum dated May 1, 2012 provided with the November 9, 2012 included recommendations to install a control valve or take other measures to "allow more change-over" in the tanks and to install a new chemical injection vault. The memorandum also noted issues with the corrosivity of the water and identified a recommended pH for one possible corrosion control strategy.
- In a letter dated May 28, 2013 written in follow up to a meeting with the Department on 3, 2013, Georgetown outlined its plan to conduct a comprehensive re-evaluation of the water system and presented in a letter report, with the assessment to include:

- A new storage tank
- Elimination of an existing storage tank or the installation of a control valve
- Installation of mixers in the tanks
- Use of chloramination
- Use of phosphates

While Georgetown's proposal to conduct a comprehensive re-evaluation of its water system and look at some specific measures would be useful, the Department has noted that the measures outlined do not include all of the items included in the plan and schedule submitted by Georgetown to meet the requirements of the ACOP. It is the intent of the Department, through ACOP, to have Georgetown implement its plan to address its water quality issues. If Georgetown now intends to modify its plan, Georgetown would need to submit such a request to the Department.

The Department approved the plan with the condition that Georgetown implement specific short term measures. The Department is seeking an update on the implementation of those measures.

The Department has also included different conditions in its approvals to modifications made. Specifically, the Department, in a January 27, 2012 letter, called a final recommended pH to be submitted. This item has not yet been completed. The Department needs to have those items also addressed as part of Georgetown's actions going forward.

Concerning the new measures, the Department has noted that some items to be evaluated as part of the proposed water system evaluation would require approval if implemented. To obtain approval, an engineering report would be required. The proposed letter report may be adequate, provided that sufficient technical details are addressed; otherwise, more detailed information would need to be submitted as part of the project approval.

Finally, several issues have come up in discussion on how to proceed with the more recent work. Specifically, a concern with preventing sulfate reduction to hydrogen sulfide was identified as part of the discussion on the proposed change in water treatment process. It is the Department's opinion that this issues needs to be addressed as part of the basis for determining the proposed treatment process.

Based on these items, the Department is requesting that Georgetown include the following as part of its water system evaluation:

- An update on the status of all items in the approved plan
- An update on the short term measures required as a condition of approval
- A final recommendation on pH as called for as a condition of approval.
- Technical details to support the proposed measures specifically identified in Georgetown's letter. For changes in storage, an assessment of the system storage

requirements, to include consideration of fire flow requirements, would be needed. The Department would not be open to seeing a reduction on flow capacity to levels below recommendations. For any proposed mixer installation, the Department would want to understand the benefit on water quality, particularly if tank turn-over would not be changed, as it is the Department's understanding that the tanks have extended turn-over.

- An assessment of the water quality conditions needed to minimize the reduction of sulfate to hydrogen sulfide.

The Department is seeking the update to the plan by August 16, 2013.

Notwithstanding the above, the Department reserves any and all rights to ensure compliance with the ACOP, including the assessment of civil administrative and/or stipulated penalties.

WATER QUALITY IMPROVEMENTS FOR THE TOWN OF GEORGETOWN

Item #	Project	Priority	Project Estimated Start	Completion	Description	Status as of 8/15/13
1	Web Road Flushing Hydrant	High	5/24/2011	5/24/2011	Allows for positive directional flushing	Completed
2	Marshall & Duffy Well KOH Chem Feed. Wright Pierce Engineering began Design of this project in the Spring of 2010 Awarding of the Construction should be in August 2011	High	11-Sep	12-Jan	Allows for pH adjustment of each well prior to filter plant for better Iron & Manganese removal, Corrosion Control within the Filters and Distribution System With these two wells pH Controlled we should be able to reduce dependency on the Commissioners well and reduce the sulfate issues in the system.	Completed
3	Water Quality Fact Sheet	High	Oct-11	12-Jan	Georgetown Water Department has begun assembling data for a Fact Sheet. A meeting to discuss this endeavor with AECOM engineering is set for 14th. It is our desire to complete the design and it printed by December 15th. And inserted into the January Water Bills.	COMPLETED
4	WTP Aeration, cleanwell / backwash supply storage tank and pumping system. AECOM engineers	High	Summer 2011 Spring 2012 Spring Fall 2012 for construction	Prelim Design Final design Financing Summer 2013	This Project will be the construction of a finished water tank for backwash and to pumping into the system. This will eliminate the severe flow and pressure fluctuations that are now prevalent in the distribution system. This tank could also allow for rechlorination, final pH adjustment distribution system. This tank could also allow for aeration of the finished water prior to distribution to help eliminate the sulfur issues in the distribution system.	Pending the outcome of the on-going Comprehensive Water System Evaluation (AECOM)

5	Modify chemical feed systems. This will require a new vault and injection station on the 12-inch raw water main. Changing over the finished lime to Liquid Caustic to further increase pH in the distribution system as necessary to inhibit corrosion and sulfate reduction	High	FY 2012	FY 2013	According to Tonka Filter, moving the Chlorine injection point farther from the Permanganate injection point could make for more efficient iron removal. AECOM is looking into the effectiveness of this and it may be done as part of the clear Well site work. This may not be necessary after the pH adjustment, pre-filter is operational.	AECOM completed the jar testing (Feb 2012) and determined that the use of sodium hypochlorite did oxidize significant amounts of iron after 60 seconds of detention time. Full-scale installation not completed.
6	Mixing system in Concrete Tank # 2	High	Summer of 2012	Prelim Design	This project should be fairly straight forward. The type of mixing system has not been determined. After the clearwell is operational, This project should help to Maintain Chlorine residuals by lowering water age in tank. We have looked at Solar Bee active mixers, Tide Flex passive mixing or fine bubble mixing/aeration. FOR NOW we have been changing the Tank Level setpoints to achieve greater turnover of both tanks.	AECOM has modeled this concept using the hydraulic model provided by the Town. The results will be presented in the Comprehensive Report, currently being prepared by AECOM.
7 & 8	Filter Recoating and Media Replacement. These items cannot be done without #4 May need a major treatment plant upgrade prior to this being feasible.	Medium	Not yet determined		These two items seemed more urgent two years ago before the fulltime operation of the KOH pre-filter pH adjustment. The internal pitting of the filters and the breakdown of the Greensand media by the low pH raw water made us think that system failure was in the near future. We were replacing 10 % of the media due losses every year. The internal ferrous metal structure and the welds showed signs of wide spread corrosion. Since the addition of the pH pre-treatment, the Greensand is not breaking down and the internal corrosion doesn't seem to be progressing at such a rapid rate.	Media was examined by Tonka in January 2013. The results showed that the grain size and uniformity was near that of new materials. The manganese oxide coating was in a fair condition with some signs of the coating beginning to dissolve or flake off some of the grains.
9	Other projects in the Wright Pierce Water System Report are ongoing		Annually Spring & fall		Unidirectional flushing of the distribution system with flows of 5 feet/sec was started in the spring of 2005 and has been done twice annually (except spring 2010).	On-going.
10		Cleaning & redevelopment	3-5 year intervals		Cleaning and redevelopment of the Commissioners Well was completed in the spring of 2010 with a high efficiency pump	Completed

11	Cleaning & redevelopment	3-5 year intervals	Cleaning and redevelopment of the Duffy's Landing well and the installation of a new high efficiency pump was completed in the Spring of 2011.	Completed
12	Cleaning & redevelopment	3-5 year intervals	Cleaning and redevelopment of the Marshall well with the installation of a new high efficiency pump and VFD drive will be completed as part of the Marshall/Duffy Rehabilitation (#2) this year.	Completed
13	Water Storage Facilities	3-5 year intervals	Inspection & Cleaning was completed in October 2011 Inspection and cleaning of all three of the existing water storage tanks is being scheduled for the Fall of 2011. Natgun was out in June 2011 to inspect an area of concrete overlay that has come loose and appears to be delaminating in a large area. The opinion is that the tank is still structurally sound. No evidence that the wall reinforcing wire is exposed.	Completed
14	Water Main Cleaning - This may not be required once the pH and flow surges are better controlled.		This may require cutting into the water system to install launch or entry sites throughout the system. Recent construction removal of water main did not show signs of excessive build-up. Chlorination & flushing may preclude the need for mechanical cleaning.	Not completed.
15	Orthophosphate or Silicate Addition. This may promote biofilm growth and tuberculation of the water mains.		This should be used as a last resort if the pH chlorination and flushing program fail to reduce the iron, manganese, sulfate, sulfide, odor complaints.	Recommendation is pending the outcome of the on-going Comprehensive Water System Evaluation (AECOM)
EFFECTIVENESS EVALUATION 12 sites have been selected around Georgetown. See enclosed map.		On-going	Georgetown has been collecting sample data for a number of years throughout the system. The Water Department has selected 12 sample sites to be sampled on a monthly basis to track changes in iron, manganese, sulfate, pH, free & total chlorine. To be able to track changes in complaint type and frequency.	Work has been ongoing. There is no established completion date.

Appendix B

0.6 MG Gunite Tank Inspection Report

Inspection Report



Georgetown, MA – 60C21

0.6 MG Gunitite Water Storage Tank



INSPECTION OF EXISTING 0.6 MG GUNITE SHOTCRETE WATER STORAGE TANK Georgetown, MA

On Wednesday October 28, 2009, an inspection of the Town of Georgetown's existing 0.6 MG water storage tank was conducted. This prestressed concrete tank was constructed by Natgun Corporation in 1961 utilizing AWWA Type II gunite corewall construction. Present at this inspection were Glenn Smith, Water Superintendent, Town of Georgetown, and Philip Watson, Senior Technical Services Engineer, Natgun Corporation Concrete Tank Services.

0.6 MG Water Storage Tank

The tank is approximately 64 feet in diameter with a 26 foot water depth, has one common 12 inch diameter cast iron inlet and outlet pipe with a sump, a gunite encased 10 inch diameter AC overflow pipe thru the floor to a 10 inch diameter cast iron pipe, one vent at the center of the dome and two aluminum dome access hatches. The tank is backfilled approximately 5 feet. The tank does not have either an interior or exterior ladder nor a wall manway.

Exterior Wall & Dome

The exterior wall was inspected and observed to be in good to fair condition. The bottom 8 feet of the exterior wall was sounded and found to be free of any hollow or drummy areas. About 15 feet above grade there is an approximate 10 square foot area of gunite covercoat that is delaminated and has a significant amount of efflorescence buildup. There is also a horizontal crack with varying degrees of efflorescence buildup at this same elevation.

The dome is in good to fair condition, however many of the previously repaired areas are beginning to deteriorate. The dome ring covercoat on the north side for at least 50% of the tank's circumference is significantly deteriorated and in some areas missing. Where the

covercoat is missing, 25 exposed prestressed wires are severely corroded and have an estimated reduction in cross sectional area of anywhere from 40 to 50% of the original profile. The original design drawings indicate 29 wires were applied to the dome ring. The exterior wall and dome has a heavy build up of environmental dirt, mold and mildew. Much of the dome was not accessible due to the wet slippery surface conditions

Appurtenances

The fiberglass vent and aluminum screen appeared to be in very good condition and functional. The two aluminum hatch covers appear functional, however consideration should be given to update them by replacing the hatch and curb.

Tank Interior

Through the northern dome hatch the interior wall appears to be in good condition. There appears to be some minor surface erosion or scouring of the inner corewall within the operating range at the top of the wall. Some of the corewall flexural or shrinkage cracks visible from the hatch had a minor amount of efflorescence buildup but otherwise no deterioration was evident. Underwater Solutions, Inc of Mattapoisett, MA performed an interior dive cleaning and inspection May 2005. Merithew Utility Service Company of Raynham Center, MA performed an interior cleaning and inspection April 2009. Copies of their respective reports are on file at the Town Water department office.

Recommendations

Based on our observations we make the following recommendations with cost estimates associated with each:

1. Tank Exterior

- Clean by high-pressure water blast, all exterior surfaces of the tank wall and dome to remove all dirt, efflorescence and other surface contaminants,

including a rinse down using a minimum 5% chlorine solution to kill all mold and mildew.

- Remove all delaminated, unbonded and spalled wall gunite. Replace the spalled gunite covercoat with shotcrete in accordance with AWWA D110.
- Perform any other incidental remedial work required to the tank wall and dome, including removal of efflorescence and minor patching to provide a sound surface for the application of a water-resistant coating.
- Apply a cementitious base coat of Tamoseal and a topcoat of Tammscoat to the exposed exterior tank wall and dome.

Cost Estimate: \$ 59,500

2. Tank Exterior Dome

A. Prestress Wire

- Drain and clean the tank interior.
- Reshore the existing dome.
- Remove existing dome ring covercoat and prestress wire.
- Reapply prestressing to original design specifications. Shoot, cut and finish shotcrete covercoat.

Cost Estimate Unit Price: \$ 110,000

B. Dome Replacement Alternate

- Drain and clean the tank interior.
- Reshore the existing dome.
- Remove existing dome ring covercoat and prestress wire.
- Using the existing dome as a stay in place form, pin the old dome, reinforce and pour a new dome overlay.
- Apply prestressing, shoot, cut and finish shotcrete covercoat.

Cost Estimate Unit Price: \$ 200,000

3. Tank Interior

- After the Town has drained the tank, clean the interior wall by high pressure water blast in order to remove any accumulated mineral deposits and flush sediment and debris out through the tank inlet and outlet to a drainage pit provided by others.
- Chip as required to sound gunite and clean all surfaces. Evaluate any resultant areas of exposed diaphragm and repair as necessary to provide a sound surface for the application an NSF approved elastomeric urethane coating.
- Apply an NSF approved elastomeric urethane coating to all interior wall surfaces. Extend the elastomeric urethane coating up onto the dome and out onto the floor a minimum of 2 feet.
- Chip, clean and patch any deteriorated roof gunite and exposed wire mesh.

Cost Estimate: \$ 109,000

4. Hatch Replacement

- Remove 2 existing hatch covers.
- Form, reinforce and cast two new hatch curbs.
- Install two new Halliday aluminum hatches with padlocks.

Cost Estimate: \$ 15,000

5. Interior Ladder

- Furnish and install one new aluminum interior ladder complete with OSHA approved safety climbing device.

Cost Estimate: \$ 12,000



Eastern Tank Wall – note horizontal crack with efflorescence.



Northern Tank Wall – note the area of efflorescence in the center of the photo is the area of delaminated covercoat.



Profile of delaminated covercoat



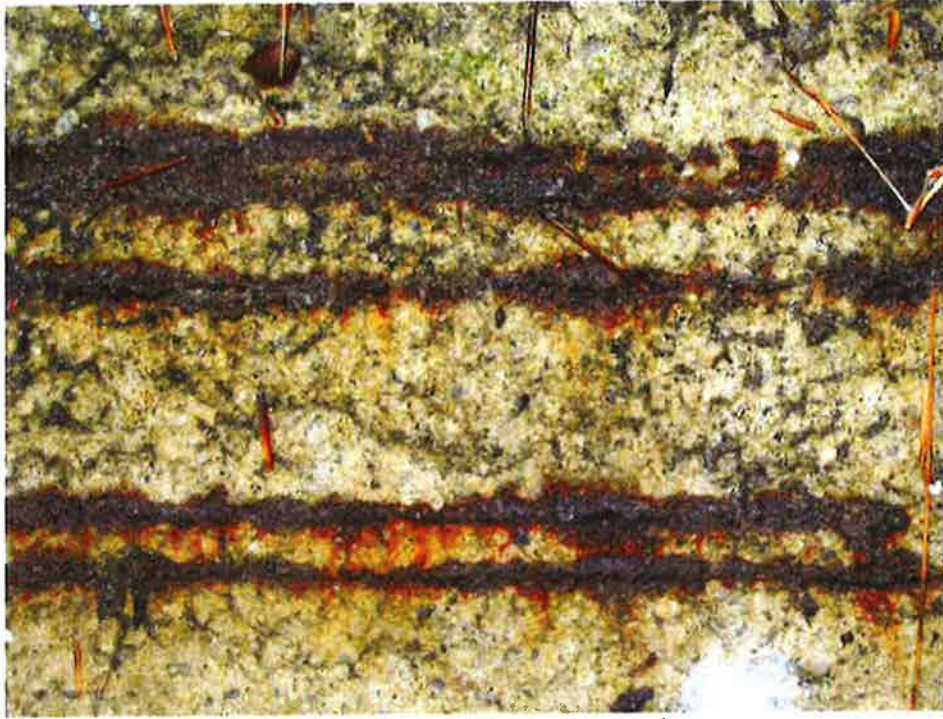
Delaminated and spalled/missing dome ring covercoat with exposed prestressed wire on the Northwest side of the tank



Corroded prestress wire



Delaminated and drummy dome ring covercoat



Closeup of corroded prestress wire



Another area on the west side of the tank.



Another area on the east side of the tank – also visible in the first photo above



Dome surface – lower areas are beginning to deteriorate – 1st of 3 sequenced photos



2nd photo looking southeast



3rd photo



Area of deterioration near northern dome access hatch

